

Economic viability of marine capture fisheries

Findings of a global study
and an interregional workshop

FAO
FISHERIES
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PAPER

377



Food
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by

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PREPARATION OF DOCUMENT

This document has been prepared by Dr. Uwe Tietze and Mr. J  l Prado, Fishery Industry Officers of the Fishing Technology Service, FAO Rome, and by Mr. Jean-Michel Lery, Consultant. It summarizes the findings of an interregional study on the economic viability and sustainability of marine capture fisheries carried out between 1995 and 1997 and gives an account of the proceedings and recommendations of an interregional workshop held in Kuala Lumpur, Malaysia, from 15 to 18 December 1997 and hosted by the Fisheries Development Authority of Malaysia.

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Cover: Purse seine, Senegal

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ABSTRACT

Between 1995 and 1997, FAO in cooperation with fisheries research institutions and administrations in selected countries in Asia, Africa, Latin America and Europe, carried out studies on the economic and financial viability of the most common fishing craft and gear combinations. Information on the level of exploitation of fisheries resources as well as government policies on fisheries management, financial services, etc., was also collected.

The countries covered by the studies include Peru, Argentina, Senegal, Ghana, China, Republic of Korea, Taiwan Province of China, Indonesia, Malaysia, Thailand, India, France, Spain and Germany. Together, they accounted for about 48 per cent of the total marine capture fisheries production in South America, Europe, Africa and Asia which again accounted for 84 per cent of the global marine capture fisheries production in 1995.

The findings of the studies were presented and discussed at an interregional workshop which was held in Kuala Lumpur, Malaysia, from 15 to 18 December 1997. They suggest that - in spite of fully and sometimes over-exploited fisheries resources - in most cases, marine capture fisheries is an economically and financially viable undertaking which generates sufficient revenue to cover the cost of depreciation as well as the opportunity cost of capital to generate funds for reinvestment in addition to employment, income and foreign exchange earnings.

With a view to safeguarding the economic performance of the fishing industry and with it the employment and income that is generated by the fishery industry, the workshop considered it pertinent that countries put in place, in close cooperation with fishers and fishing industry associations, efficient measures to limit fishing effort, preserve and rehabilitate coastal areas and aquatic resources and make special efforts to protect small-scale fisheries sectors. It was observed that only few countries had already introduced these measures.

As far as the role of subsidies is concerned the information which could be collected was limited. However, it was observed that the number of subsidies in developing countries has recently been greatly reduced. Presently, subsidies were only available in some cases for offshore fishing, artisanal fisheries and fisheries cooperatives and for fishing operations in remote and underdeveloped areas. These subsidies were mainly available in the form of capital subsidies and reduced duty on fuel, and even these were in the process of being further reduced. It was also noted that in comparison to developing countries, more subsidies for fisheries sector were available in the EC, e.g., capital subsidies, reduced tax on fuel, compensation for non-fishing days, minimum prices for catch, etc.

The interregional workshop observed that the scope and duration of the studies were limited and participants agreed to expand the monitoring of the economic performance of their fishing industries.



Artisanal fishing boat, Bali, Indonesia

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LIST OF ABBREVIATIONS

ABD	African Bank for Development
APRACA	Asia and Pacific Rural and Agricultural Credit Association
CPUE	Catch per unit of effort
EC	European Community
EEZ	Exclusive Economic Zone
EU	European Union
FRP	Fibre-reinforced Plastic
GPS	Global Positioning System
GRT	Gross registered tonnage
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICSF	International Collective in Support of Fishworkers
IDA	International Development Association
IDAF	Integrated development of artisanal fisheries
INFOPESCA	Centre for Marketing Information and Advisory Services for Fishery Products in Latin America and the Caribbean
KW	Kilowatt
LKIM	Fisheries Development Authority Malaysia
LOA	Length overall
MACTRANS	Malaysian Centre for Transport Studies
MEY	Maximum economic yield
MSY	Maximum sustainable yield
NABARD	National Bank for Agriculture and Rural Development
NCF	Net cash flow
NEKMAT	National Fishermen's Association
ROI	Return on Investment
RRB	Regional Rural Bank
SOFA	State of Food and Agriculture
TAC	Total allowable catch
TCP	Technical Cooperation Programme
TCDC	Technical Cooperation between Developing Countries
TE	Total earnings

1. INTRODUCTION AND BACKGROUND

Special efforts are presently being made by national governments and international organizations in connection with the implementation of the Code of Conduct for Responsible Fisheries, to reduce and adjust, where appropriate, the capacity of fishing fleets and to diversify fishing away from overexploited fisheries resources to less exploited ones.

These efforts are being pursued in order to use and conserve both fisheries resources and coastal environment in a sustainable manner, at the same time consolidating income and employment in the fisheries sector. This important source of animal protein, particularly for poorer sections of the population, and fundamental guarantor of food security is thus safeguarded and sustained foreign exchange earnings are guaranteed for many countries. It is unlikely that environmental and natural resource issues can be addressed successfully without taking social and economic concerns into consideration.

As part of this objective, information has been collected on the biological, technological, social, economic and financial aspects of fishing operations in order to help decision-makers to adjust and diversify fishing effort at the national, regional and global level.

It is in this context that the Fishery Industries Division of FAO, in cooperation with national fisheries administrations and research institutions has carried out a study on costs and earnings of "typical" fishing craft and gear combinations in selected countries of Asia, Africa, Latin America and Europe.

As part of this study, between 1995 and 1997 information was compiled and analysed through empirical studies and compilation and interpretation of secondary data, on the financial viability of the most important and 'typical' segments of national fishing fleets, fish production and catch rates, fishing grounds, species fished and levels of exploitation, technical dimensions and particulars of fishing craft and gear, generation of employment and income, and other aspects.

The need for the study should be seen in the following context:

- In most developing countries, primary information on costs and earnings of capture fisheries is not collected on a regular basis and up-to-date information is not available. This was confirmed when countries were contacted for inclusion in the study and during library searches on the topic.
- A number of changes have recently taken place, such as technological changes; the degree of exploitation of aquatic resources; macro-economic and micro-economic changes, including liberalization of markets and privatization of fishery enterprises, infrastructure and financial services; the role of subsidies as related to capital investments and to the cost of fishing operations.

The countries contacted in the course of the study expressed strong interest in generating up-to-date information on the cost and earnings of fish harvesting, at present not available in most developing countries. Fisheries administrators in these countries are well

aware that the economic and social implications of fisheries management measures cannot be properly assessed without this information and that realistic and meaningful policies and regulations for fisheries management can be neither designed nor implemented.

The information generated by the study and from the discussions and deliberations of the Workshop aims to provide guidance to both fishers and their organizations, and to fishery enterprises and fisheries administrations in the sustainable use of fisheries resources. Advice and guidance for investors and financial institutions on how to support the necessary changes through investment and credit programmes is also needed.

2. METHODOLOGY

2.1 Scope and coverage of the study

The study began in the last quarter of 1995. At that time, an analysis of cost and earnings of fish harvesting and utilization was also envisaged but the study was later limited to fish harvesting only.

Targeted case studies were undertaken, mostly under Contractual Services Agreements, in the 11 countries that had responded to the request of the Fishery Industries Division. Asia was represented by China, the Republic of Korea, Indonesia, Malaysia and India and additional information is presented from Thailand. Africa was represented by Ghana and Senegal; Latin America by Argentina and Peru; and Europe by Spain, Germany and France.

Appendix II shows which part of the regional and global marine catch was contributed in 1995 by the countries included in the study. These countries accounted for 49 percent of the marine capture fisheries production in Asia, Latin America, Africa and Europe, which, in turn, contributed 84 percent to the global marine capture fisheries production in 1995. The countries covered by the study accounted for 41 percent of the global marine catch.

Asian and Latin American countries were most comprehensively covered by the study; countries participating accounted for about 61 and 52 percent of the total marine catch in their region in 1995, respectively. Two West African countries (Senegal and Ghana) accounted for 17 percent of the total catch for Africa in 1995. In Europe, Spain, France and Germany were covered which accounted for 16 percent of the total European catch. North America, Oceania and the former USSR were not covered by the study.

2.2 Methodology and variables

Information on cost and earnings of fishing fleets has been generated through empirical studies, carried out in cooperation with national fisheries administrations and fisheries research institutions. Wherever possible, this has been complemented, cross checked and compared with secondary data, national fisheries and other statistics.

Interviews were conducted with skippers, crew and knowledgeable key informants of fishing units who were specifically selected for their perceived responsiveness. Units were

chosen for their typical conditions of operations and characteristics with regard to age and technical features.

The methodology for studying and analysing data on cost and earnings of fishing units followed that used in the study Costs and earnings of fishing fleets in four EC countries, published by the Department of Fisheries of the Agricultural Economics Research Institute (The Hague, 1993) and funded by the European Union.

The following parameters were studied:

- Techno-economic and operational characteristics of fishing
- Fleets operating in country of study
- Techno-economic and operational characteristics of individual fishing units
- Financial and economic characteristics of individual fishing units
- Financial services available to fisheries sector including institutional credit programmes and subsidies
- Levels of exploitation of fisheries resources
- National plans for fleet restructuring and adjustment.

Variables

More specifically, the following variables have been covered:

Techno-economic and operational characteristics of fishing fleets operating in country of study

- Characterization of fishing fleets/category of fishing vessel by type of fishing technology/species caught, etc.
- Approximate number of fishing units constituting the fleet
- Description of fishing area in terms of distance from shore, depth, etc.
- Species caught, landed, discarded at sea
- Fisheries legislation and regulations affecting fishing operations
- Age structure of fleet
- Plans for future development of fleet and its fishing operations including: potential for development of new fishing areas and for exploitation of new/different resources; need to replace fishing units over next decade to maintain or expand size of fleet; need to reduce fishing effort and size of fleet.

Techno-economic and operational characteristics of individual fishing units

For each fishing fleet identified above, a typical fishing unit has been described. The average value/characteristic has been given for each variable, followed by the range of values that apply to most fishing units of the fleet.

- Length of vessel
- Tonnage
- Propulsion and HP
- On-board facilities for processing and storage of catch: volume of fishhold(s); freezing capacity (tonnes per day); machinery for processing the catch
- Fishing gear and capacity: type and quantity/dimensions of fishing gear available with vessel
- Crew size and composition
- Ownership of fishing unit and sharing, if any, of operational expenses and income: type of ownership and sharing systems
- Operation of fishing unit: fishing days per annum and average duration of fishing trips; fishing seasons and off-seasons by month

Financial and economic characteristics of individual fishing units

- Investment costs: hull; deck equipment, including equipment for navigation, fish detection, communication, safety fish storage, preservation and processing etc; engine and propulsion; fishing gear and equipment.
- Annual cost of fishing operations: fuel, lubricants; harbour fees and charges; insurance and licence fees; taxes; repair and maintenance of fishing vessels and gear; replacement of fishing gear and material; provisions and stores; crew wages/salaries/shares and other crew expenditure
- Revenue: volume, composition and value of catch of fishing vessel per annum.

Financial services available to fisheries sector including institutional credit programmes and subsidies

- Access of this category of fishing unit to institutional credit;
- Terms of finance, e.g. amount available as credit and specific purpose for which loan is available, target group of loan (individual/cooperatives), repayment period of loan,

interest rate (whether subsidized); equity and collateral requirements; availability of capital subsidies

- Availability of tax exemptions.

Level of exploitation of stocks targeted by fishing fleets

Interest calculation

As far as possible, real costs of interest for repayment of loans have been used. More specifically:

- in most cases, interest figures were directly indicated in the studies;
- in other cases, interest was calculated taking into consideration the loan amount, commercial interest rates indicated in the study and the amount of compound interest divided by the number of years;
- in cases where data were unavailable, estimates have been compiled, according to the most frequent financial conditions indicated, i.e. loan = 80 percent of investment, rate of interest = 8 percent and duration = 10 years.

Calculation of depreciation

When calculating depreciation, three main methodology references have been used:

- The publication Costs and earnings of fishing fleets in four EC countries (see p.3). This gives a breakdown method for costs and earnings on a uniform basis; a method for depreciation allowance estimates starting from vessel overall value for hull = two-thirds of investment and engine = one-third of investment; and depreciation rates for semi-industrial and industrial vessels: hull = 4 percent, engine = 10 percent, deck equipment = 10 percent, fishing gear = 20 percent.
- Capital needs and availabilities in artisanal fisheries (IDAF Technical Report Accra, 1994). This gives depreciation rates for artisanal canoes in Ghana and Senegal: hull = 15 percent, outboard motor = 30 percent, deck equipment = 10 percent, fishing gears = 20 percent.

Profitability analysis of fishing fleets from EC countries, Coopers & Lybrand - Grecco (Quimper - France, 1996). This gives depreciation allowances for nine out of 15 types of vessels covered by the Spanish study calculated from the insured value of these vessels.

The studies carried out at the national level provided detailed data up to gross cash flow level and in many cases up to net cash flow level. Where no information had been provided on the cost of depreciation, estimates were calculated as follows:

- if figures were available for the same type of fishing vessel, but of a different size, proportional calculations were made;

- if no data were available for a fishing vessel of the same country of the same type, a foreign vessel of the same type and size was taken for reference;
- if no data were available calculations were based on the assumed value of hull, engine, and fishing gears according to the size, power and type of fishing craft or gear.

3. PROCEEDINGS OF INTERREGIONAL WORKSHOP

The findings of the study were presented and discussed at an interregional workshop hosted by the Fisheries Development Authority of Malaysia (LKIM) and held in Kuala Lumpur, Malaysia from 15 to 18 December 1997.

3.1 Participation and organizational arrangements

The workshop was attended by 33 senior executive-level participants from 13 countries of South America; West Africa; Europe; South, Southeast and East Asia; as well as representatives of the Asia and Pacific Rural and Agricultural Credit Association (APRACA) and the International Collective in Support of Fishworkers (ICSF). The participants came from national fisheries administrations, fisheries research, academic and financial institutions as well as from private companies. Interest in the workshop was reflected by the fact that many participants attended at their own expense. The list of participants is shown in Appendix III. The excellent organizational, logistic and administrative arrangements of the host, LKIM, were highly appreciated.

3.2 Proceedings

The workshop was inaugurated by Y.B. Dato' Haji Zakaria bin Said, Chairman of LKIM. Dr Uwe Tietze, FAO Fishery Industry Officer, began the proceedings by explaining the organizational arrangements and expected outputs of the workshop; giving an overview of the methodology used by the global study of the techno-economic viability of marine capture fisheries and of the major findings.

Mr J. Prado, FAO Fishery Industry Officer, gave a key presentation on technical features of fishing fleets, fishing capacity and recent changes in fishing effort.

The remaining part of the first day and most of the second was devoted to the presentation of and discussions on the findings of the various case studies and studies at the national level which had been carried out in the context of the global study coordinated by the FAO Fishery Industries Division. Additional technical presentations were made on the application of fleet management systems to fishing fleets and fishery resources, on economic returns from fish processing, i.e. supply responses of frozen tuna raw material, and on the use of cost and earnings studies as a tool for fisheries management.

The third day began with a field trip; three working groups were then formed which drew conclusions from the findings of the global study and formulated recommendations in three areas: to enhance the economic viability of sustainable fishing practices including

supporting credit and investment programmes; to promote the use of resource and environmentally friendly fishing technologies; and to monitor further economics of capture fisheries and expand to processing and marketing.

The fourth and last day of the workshop began with presentations by representatives of the APRACA, ICSF and GOPA, a private consulting firm. The conclusions and recommendations of the working groups were then discussed, finalized and adopted in plenary. A closing session ended the workshop.

4. SUMMARY OF FINDINGS

4.1 Findings by continent

The studies, surveys and information presented and discussed in the workshop covered countries in Latin America, Asia, Africa and Europe. The fishing fleets and units covered all major types of medium- and large-scale fishing vessels operating in these countries. Small-scale/artisanal fishing boats were only covered in Ghana, Senegal, France, Indonesia, Malaysia and, in a limited way, in India.

The case studies of fishing units in Latin America, Africa, Europe and Asia suggest that - in most cases and in spite of heavily and sometimes overexploited fisheries resources - marine capture fisheries are still an economically and financially viable undertaking generating sufficient revenue to cover the cost of depreciation as well as the opportunity cost of capital and thus generating sufficient funds for reinvestment as well as employment, income and foreign exchange earnings. A lack of information in Asia and America was noted with regard to the economic performance of artisanal and small-scale inshore capture fisheries.

Even though limited information was collected on financial services available to the fisheries sector including institutional credit programmes and related subsidies, it cannot be concluded to which extent the economic performance of the fishing units studied has been effected by macro-economic financial transfers e.g. indirect subsidies such as exemptions from taxes on production inputs etc. Also external benefits and costs if any such as those resulting from environmental damages etc. have not been taken into consideration.

It was also observed that in many cases, the information available at country level on the level of exploitation of fisheries resources targeted by specific fishing fleets was not very accurate and efforts need to be made to improve the collection and analysis of fisheries statistics at the national level. This issue was also addressed by the working groups convened at the end of the interregional workshop which reviewed the findings of the studies. The recommendations of the working groups are summarised in this report.

As far as the relationship between economic viability and sustainability of marine capture fisheries is concerned, the discussions of the working groups suggest that this is a rather complex relationship as there are many intervening factors. Specific recommendations were made as to how this aspect should be studied more in depth.

Altogether, the studies and their findings presented in this report should be seen as a first step in compiling and presenting much needed information on the economic performance of marine capture fisheries. The recommendations of the working groups presented below include many useful suggestions as to how the information needs to be complemented with regard to the role of macro economic aspects including financial transfers, information on the disposal of catch, processing and marketing etc.

More specifically, the findings suggest the following:

Findings from Ghana/Senegal

Only small-scale encircling gillnetting and deep sea fish/shrimp trawling in Senegal generated a negative net cash flow. All other fishing practices (the operation of small-scale hook and line, driftnetting, bottom set gillnetting, beach seining, purse seining and multi-purpose operations; medium- and large-scale fish and shrimp trawling, pole and line fishing) generated a positive net surplus.

Findings from Peru/Argentina

While large-scale trawling in Peru had a negative net cash flow, purse seiners in both countries and trawlers in Argentina generated a positive net surplus.

Findings from Asia

All fishing fleet units covered in the Republic of Korea, Taiwan Province of China and Malaysia generated a positive net surplus, as did five out of seven typical medium- and large-scale fishing units in China and seven out of eight typical fishing units in Indonesia. The fishing units generating positive net returns included purse seiners, bottom and mid-water trawlers and pair trawlers, jiggers, stow netters, set netters, seiners, tuna handliners, pole and line vessels and longliners. Negative net results were achieved by small-scale gillnetters in Indonesia and smaller bottom pair trawlers and stow netters in China.

While the three types of medium- and large-scale fishing units studied in India - tuna longliners, purse seiners and trawlers - generated a positive net surplus, two out of three small-scale units, i.e. seiners and handliners, scarcely broke even or had negative net cash flows.

Findings from France/Spain

Of the 23 types of small-, medium- and large-scale fishing vessels studied in France and Spain, only two types of deep-sea trawlers operating in France had negative net results while the other 21 types of vessels including handliners, gillnetters, seiners, pole and line vessels, longliners and in-shore and off-shore trawlers all generated a positive net surplus.

In West Africa no significant difference in performance of small-scale fisheries compared with medium- and large-scale fisheries was observed. In Ghana and Senegal, the small-scale sector generally performed well except for encircling gillnetters in Senegal. In Indonesia and India, the economic performance of artisanal and small-scale inshore capture



Pirogue, Senegal



Fishing canoe, Ghana



Fishing boat, Ghana

fisheries seemed to be negatively influenced and hampered by medium-scale and large-scale inshore and off-shore purse seining and trawling operations. In France and Germany, the small-scale sector seemed to perform reasonably well. No information was available for Spain.

It was observed that the number of subsidies in developing countries had recently been greatly reduced. At present, subsidies are only available in some cases for offshore fishing, artisanal fisheries and fisheries cooperatives and for fishing operations in remote and underdeveloped areas. These subsidies are mainly available in the form of capital subsidies and reduced duty on fuel and even these are in the process of being further reduced.

It was also noted that, compared with developing countries, more subsidies for the fisheries sector were available in the European Community (EC), e.g. capital subsidies, reduced tax on fuel, compensation for non-fishing days, minimum prices for catch, etc.

4.2 Economic performance of selected fishing practices by region

In the following section, a comparison has been made between the economic and financial performance of selected fishing practices by region. For details, refer to Appendix I. The following indicators have been used:

- For assessment of economic performance: net cash flow/total earnings (NCF/TE). This ratio is a general indicator of economic profitability/viability of economic enterprises. A level above 10 percent is generally considered good.
- For assessment of financial performance: net cash flow/investment = Return on investment (ROI). This ratio is the major indicator for financial performance. A level above 10 percent is generally considered good.

Africa:

In both countries studied, i.e. Ghana and Senegal, the best economic performances are shown by traditional, small-scale marine capture fisheries:

Pelagic fishing (%):

Purse seining canoes:

	Ghana	Senegal
NCF/TE	10.6	17.0
ROI	21.1	44.8

Beach-Seining

	Ghana		Senegal
	Non-motorized canoes	Motorized canoes	
NCF/TE	25.2	10.6	
ROI	48.0	16.5	

Drifting Gill-Netting

NCF/TE	7.9
ROI	19.5

*Demersal fishing (%):*Bottom Gill-Netting:

NCF/TE	21.3
ROI	45.5

Multipurpose Canoes:

NCF/TE	16.2
ROI	30.6

Hook and Line:

NCF/TE	11.5	2.0
ROI	51.5	8.6

Semi-industrial fishing boats exploiting inshore areas are economically less efficient or even inefficient such as semi-industrial trawlers and purse-seiners in Ghana, which still have a positive net cash flow and trawlers in Senegal, which show a negative net cash flow.

Industrial fishing vessels fishing offshore in Ghana for tuna and shrimp achieve very favourable financial and economic results as shown below:

Pole and liners (tuna)

NCF/TE	21
ROI	21.4
%	

Bottom trawlers (shrimps)

NCF/TE	21.7
ROI	22.2
%	



Latin America

Purse seiners in Peru and trawlers fishing for hake in Argentina seem to have a good profitability which increases with the size of the vessels.

Fish prices differ considerably between trawlers fishing for hake in Peru and Argentina. The Argentinian study stated a price for hake (*Merluccius hubbsi*) of US\$310/tonne while information from INFOPECA indicated price levels for *Merluccius gayi* caught by the Peruvian vessels of approximately half of the price of *Merluccius hubbsi* which amounts to US\$155/tonne.

Pelagic fishing: Purse seiners in Peru:

Size of fishhold of vessel (m ³)	35	180	270	350
NCF/TE	15.7	19.3	22	37.2
ROI (%)	7.6	11.3	13.6	26

Demersal fishing: Trawlers in Argentina:

Length of vessel (m)	25	30	35
NCF/TE	12.4	20.2	24.8
ROI (%)	13.6	17.7	24.1

Trawlers in Peru (fish price revalued at US\$155/tonne)

Size of fishhold of vessel (m ³)	80	140	220
NCF/TE (%)	45.8	40.4	7.7

East Asia

Pelagic fishing: good economic and financial performances are reported for purse seining in China, tuna purse seining in Taiwan Province of China and mid-water trawling in the Republic of Korea.



Stern trawler, China



Dredgers, China

Purse seiners:

China

Tuna purse seiners

Taiwan Province of China

NCF/TE	35.8	15
ROI	14.7	12.3
(%)		

Mid-water trawlers (anchovy)

Republic of Korea

NCF/TE	10.2
ROI	14.4
(%)	

Demersal fishing: good performances are reported for Danish seiners and single trawlers in the Republic of Korea, bottom pair-trawlers in China and the Republic of Korea, set netters in China and medium performances for jiggers. Stow netters did not perform well in either country.

Danish seiners

Republic of Korea

	Large	Middle (W-S sea)	Middle (E sea)
NCF/TE	27.2	15	4.2
ROI	81.6	15.5	6.0
(%)			

Bottom pair trawlers

China

Republic of Korea

NCF/TE	16.3	9.9
ROI	14.9	19.1
(%)		

Bottom single trawlers

China

Republic of Korea

NCF/TE	2.1	33
ROI	2.7	36.9
(%)		

Set-Netters

China

NCF/TE	21.5
ROI	93.7
(%)	

Jiggers

China

Republic of Korea

NCF/TE	18.3	11.6
ROI	6.2	11.1
(%)		

South and Southeast Asia

Only semi-industrial and industrial fishing vessels have been surveyed in India and Indonesia. The economic and financial performance of purse-seiners, longliners and pole and line vessels fishing for tuna is compared below.

*Pelagic fishing:*Purse Seiners:

	India	Malaysia	Indonesia	
Length/size of vessel	13 m	30/40 GRT	17 m	25.6 m
NCF/TE	21.7	10	25	6.4
ROI	16.2	15.9	19	4.8
(%)				

The figures suggest that profitability is much higher for smaller size purse seiners of 13 or 17 m while larger vessels of 25.6 m are more expensive to operate as fuel costs and depreciation allowances are higher. Another reason may be that prices for small pelagic fish are rather low in Southeast Asia and do not allow for sufficient returns for larger types of purse seine boats.

The situation for tuna longliners is quite different since larger longliners are economically and financially more efficient than smaller ones.

Longliners (tuna):

	India	Indonesia
Length of vessel (m)	36	23.4
NCF/TE	23	6
ROI	20.5	2.3
(%)		



Purse seiner, Malaysia



Trawler, Malaysia

Medium-size longliners may be less efficient than larger ones because of lack of range, which is an important factor in tuna longlining. .

In Indonesia both vessel sizes surveyed showed good financial and economic performances for tuna pole and line fishing,

	<u>Pole and liners</u> (tuna) Indonesia	
GRT	10	30
NCF/TE	16.4	20.4
ROI	29.6	23.9
%		

Stern trawlers performed well in India but less well in Malaysia, probably because of overexploitation of demersal resources.

<i>Demersal fishing:</i>	<u>Stern-trawlers</u>	
	India	Malaysia
NCF/TE	19.1	7.5
ROI	24	5.7
(%)		

Among traditional demersal fishing methods practised in Malaysia, handlining was the economically and financially most beneficial fishing method. Drift gillnetting has only a marginal positive net cash flow and just breaks even, probably because of competition from trawling, purse seining and heavy exploitation of resources.

	<u>Handliners</u>	<u>Portable traps</u>
	Malaysia	
NCI/TE	25.2	9.3
ROI	22.3	4.8
(%)		

Europe

In general, the marine capture fisheries of France, Germany and Spain are facing a serious situation for two reasons:

- Fishery resources can be considered overexploited in European waters, i.e. the Northeast Atlantic, the North Sea, the English Channel and the Bay of Biscay;
- commercial agreements have abolished custom duties for imported fish and European prices slumped during 1993-1994.

France The most profitable types of fishing boats are small-scale coastal fishing units, for the reasons outlined above.

Pelagic fishing: Coastal seiners (Atlantic)

Length of vessel (m)	15
NCF/TE	12.4
ROI	29
(%)	

Demersal fishing: Handliner (Atlantic)

Length of vessel (m)	8-10
NCF/TE	25.2
ROI	29.9
(%)	

These good performances depend on low running costs (especially fuel) and depreciation allowances (many artisanal boats are more than 25 years old).

Some other kinds of larger fishing vessels reach less favourable but still positive results:

Bottom Gillnetters

Length of vessel (m)	12-20
NCF/TE	2.8
ROI	1.3
(%)	

Deep-sea trawlers

Length of vessel (m)	19-20.5
NCF/TE	4.6
ROI	3.1
(%)	

Germany: The few remaining freezer trawlers operating in northern waters have a low profitability but still achieve positive results.

NCF/TE	1.7
ROI	1.2
(%)	

As in France, the small-scale, highly specialized German cutter fleet of shrimp and fresh fish trawlers achieves quite good results based on low running costs and depreciation as shown below:

<u>Cutter fleets:</u>	Shrimp trawlers	Fresh fish trawlers
NCF/TE	26.4	14.2 (NS and Baltic) 23.2 (Sassnitz)
ROI	18.2	10.8 18.4
(%)		

Spain Spain has a wider range of fishing vessels and fishing areas, especially if the offshore factory trawlers are included. The economic situation differs completely for inshore and offshore fisheries with the result that inshore fisheries have better results.

Pelagic fishing

Inshore fishing

	(Atlantic) <u>Pole and liners</u>	(Med.) <u>Coastal seiners</u>	(Atlantic) <u>Coastal seiners</u>
Length of Vessel (m)	24	24	17
NCF/T	10.6	18.5	6.7
ROI	26.5	31.1	13.1
(%)			

Offshore fishing

Purse seiners fishing tropical tuna had rather poor results in 1994, because of the weak US dollar; however, the situation improved in 1996 and the long-term outlook of the fishery is considered quite good.

Demersal fishing

Inshore fishing

	(Med.) <u>Coastal trawlers</u>	(Atlantic) <u>Coastal trawlers</u>
Length of vessel (m)	18	18
NCF/TE	12.2	5.7
ROI	15.5	7.4
(%)		



Purse seiner, France



Stern trawler, France

When interpreting the differences between the economic and financial performances of trawlers operating in the Mediterranean and in the Atlantic, it should be remembered that prices for fresh fish in the Mediterranean are much higher than prices obtained by trawlers operating in the Atlantic.

The economic results of selected types of Spanish offshore vessels are shown below.

Deep sea trawlers

Length of vessel (m)	23
NCF/TE	8.6
ROI	7.3
(%)	

Longliners

Length of vessel (m)	20
NCF/TE	8.3
ROI	16
(%)	

Offshore fishing

Freezer trawlers (SE Atlantic)

Length of vessel (m)	57
NCF/TE	17.9
ROI	12.1
(%)	

The above findings seem to show a slightly different picture from the one projected in the special chapter on "Marine fisheries and the law of the sea: a decade of change" in the FAO publication The State of Food and Agriculture 1992 which, based on data from 1989, suggests that the global marine capture fishery industry is incurring considerable losses, including operational ones.

The differences may probably be attributed to the following factors. First, the earlier global SOFA estimate was arrived at through macro economic analysis and interpretation and extrapolation of secondary data while the more recent findings of the studies presented in this report are based on micro economic analysis and primary data collection. Thus a direct comparison of the findings of the two studies is not appropriate.

Furthermore, the scenario presented in SOFA 1992 was based on calculations which incorporated methodological shortcomings such as the overestimation of the costs of fishing

through the assumption of an annual depreciation of 10 percent of the replacement cost of a fishing vessel and related high estimates of the annual cost of maintenance and repairs. Usually, cost and earning studies assume a lifespan of 25 years for medium and large fishing vessels.

When considering the differences between the findings of the studies presented in this report and the estimates of SOFA 1992, it should also be noted that the focus of the studies presented here is on developing countries in Asia and, to a lesser extent, on developing countries in West Africa, Latin America and certain European countries, i.e. Spain, France and Germany. The previous estimate was global, including North America, the former USSR and Oceania.

As the cost of operation of fishing vessels in Asia, Africa and Latin America, covered by the recent study, is considerably lower than for example, in the United States, Japan or Northern Europe, which were included in the SOFA 1992 estimate, and as fishing operations by the state-owned fishing enterprises of the former USSR, also included in the SOFA 1992 estimate may not have been conducted as efficiently as those carried out by private-sector operators, it is not surprising that the more recent study shows a more positive picture in terms of economic efficiency and viability.

Subsidies have little effect on the findings of the study. In most developing countries in Asia, West Africa and Latin America, subsidies are no longer available and have not been entered in the calculation of costs and returns. The granting of subsidies might have had an impact on the economic viability calculations of fishing vessels in the EU countries studies: Spain, France and Germany.

The validity of the findings of the micro-economic study presented in this report may also be confirmed by other recent empirical studies on costs and earnings of marine capture fisheries carried out in some of the countries studied such as France and the West African countries. Results achieved are similar to those found in studies coordinated by FAO and presented in this report. This includes the study by four leading European Fisheries Research Institutes: the Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER), the British Sea Fish Authority (SFIA), the Danish Institute of Fisheries Economics Research (DIFER) and the Dutch Agricultural Economics Research Institute (LEI-DLO) entitled Costs and earnings of fishing fleets in four EC countries and the study on capital needs and availability in artisanal fisheries in West Africa, published as IDAF/FAO Technical Report No. 65, Cotonou, Benin, 1994.

5. CONCLUSIONS AND RECOMMENDATIONS

The workshop adopted specific recommendations on how to continue the monitoring of the economic viability of marine capture fisheries and how to promote the use of sustainable fishing practices. The workshop recommendations also identify the role that FAO, national governments, fisheries research institutes, fishers and fishing industry associations and others should play. The recommendations of the working groups as adopted in plenary are shown in Appendix IV.

It was recommended that future monitoring of the economic viability and sustainability of marine capture fisheries, should validate, update and supplement information presented and discussed at the workshop. Economic performance of marine capture fisheries should also be monitored to encourage sustainable use of fisheries resources and the introduction of responsible fisheries. It was suggested that while the coverage of countries and fisheries should be expanded, the institutions, organizations and individuals involved in the study on the techno-economic viability of fishing practices should form the core of the future monitoring mechanism. Regarding the purpose of monitoring, choice of indicators, data sources, mechanisms and coverage, the following was suggested.

The purpose of the future monitoring of economic viability and sustainability of marine capture fisheries should be to provide: investment information for bankers, investors and entrepreneurs; information for fishers, entrepreneurs and their associations for comparison of economic performance; information for government for design and implementation of fisheries and environmental/coastal area management policies, regulations and measures and of provision of information for scientific research.

The indicators to be monitored, as identified by the workshop participants, relate to the level of exploitation of fisheries resources exploited by particular craft gear combinations in terms of development of total catch per unit of effort (CPUE), and catch composition. They further include such economic and financial indicators as cost of investment, earnings, direct costs of operations, administration costs/overheads, depreciation, interest/opportunity cost of capital, various gross margins, net surplus before tax, taxes, net surplus minus tax, sharing systems and earnings per crew member. The ratios to be monitored include the rate of return on investment, the rate of profit to earnings and the rate of net surplus + taxes + wages to investment.

A suggestion was made to carry out special case studies on the impact of natural phenomena such as typhoons and El Niño on the economic performance of fisheries sector and on fish marketing and processing.

Suggestions were made for the following:

Data sources: monitoring should include fishing companies/accountants, fisher associations, landing sites/harbours, fishermen settlements; in all countries, small-scale fishing fleets.

Methodologies: interviews should be conducted every four months for specifically selected, stratified sample of operators, buyers, suppliers, financiers, companies, accountants.

Participating institutions and organizations: should be the same as in the present study plus independent academic and research institutions and fisheries associations and fishery industry associations.

Funding: participating institutions and organizations should be funded with contributions from fishing enterprises, fishermen's associations and with support from FAO under TCDC, TCP and FAO Regular Programme. Further funding should be explored from private sector and donors.



Tuna longliner, Indian Ocean



Tuna longliner, South Pacific

APPENDIX I

Selected features of economic viability of marine capture fisheries by country

1. Asia

1.1 China

Fishing fleet and fishing technology in East China Sea

<u>Category of fishing vessels</u>	<u>No.</u>
Powered fishing vessels	114 010
Steel fishing vessels	
>600 HP	502
<600 HP	9 985
Sub-total	10 487
Wooden fishing vessels	
>15 HP	38 401
<15 HP	65 122
Sub-total	103 523
Unpowered fishing vessels	200 000
TOTAL	314 010

<u>Type of fishing technology used</u>	<u>East China Sea</u> <u>% of volume of total catch</u>
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Trawling	54
Set net fishing	25
Gillnetting	7
Purse seining	6
Longline and hand	
Line fishing	2
Others	6

<u>Fishing areas</u>	<u>China</u> <u>% of volume of total</u> <u>marine catch</u>
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East China Sea	85
Yellow and Bohai Sea	8
South China Sea	1
Others (deep sea and distant waters)	5

The East China Sea is China's most important fishing area, especially the coastal waters of Jiangsu, Zhejiang, Fujian Province and of the City of Shanghai (Lusi, Zhoushan fishing grounds). Most fishing grounds are between 100 and 200 meters deep.

Fisheries legislation and regulations

The following management measures and regulations are in place:

- An increasing number of fishing vessels are controlled through licence systems;
- fishing areas are delineated; fishing vessels operating in these areas are controlled;
- closed areas and closed seasons (01/07 to 31/08) have been established;
- MSY and MEY have been established for important species, i.e. yellow croaker, little yellow croaker, long hairtail, triggerfish, etc.

Techno-economic and operational characteristics of individual fishing units

Type of vessel	Length (m)	GRT	HP	On board storage facilities	Fishing gear	Ownership
Purse seiner	42.4	80	600	Ice + Fishhold 137 m ³	1 purse seine	State-Owned Company
Purse seiner	27.8	37.6	279	12.4 m ³	1 purse seine	State-Owned Company
Bottom-pair trawler	38.3	235	367	156 m ³	3 trawl nets	State-owned Company
Bottom-pair trawler	25-28	80-95	183	24 m ³	Bottom pair trawls	Share-owned by crew
Single trawler	15-16	65	150	24 m ³	Single trawl	Share-owned by crew
Jigger	44.8	270/304	551/735	Freezing 190 m ³ + 10t/day	12 jigging machines	State-owned company
Set netter	29.5	67	147	Ice + Fishhold 26 m ³	Set net 100 pieces	Share-owned
Stow netter	30.5	107	198	37 tonnes	Stow net	Share-owned
Stow netter	27	115	183	90 tonnes	Stow net	Share-owned

Type of vessel	Fishing days	Average duration of fishing trips	Fishing seasons (off-seasons)
Purse seiner	246	30 days / trip	Jan-Feb and Jul-Dec (Mar-June)
Bottom pair-trawler	300	15/20 days / trip	Jan-Jun and Sep-Dec (Jul-Aug)
Bottom pair-trawler	305	15 days / trip	"
Single trawler			All year long
Jigger	220	220 days	Jun-Dec (Jan-May)
Set netter	300	1/12 days / trip	Jan-Jun and Sep-Dec (Jul-Aug)
Set netter	202	1/9 days / trip	Jan-Jun and Sep-Dec (Jul-Aug)
Stow netter	300	11/12 days / trip	Jan-Jun and Sep-Dec (Jul-Aug)
Stow netter	160	7/9 days / trip	Jan-Jun and Sep-Dec (Jul-Aug)

Financial and economic characteristics of individual fishing units

Type of vessel	Purse seiner	Bottom-pair trawler	Bottom-pair trawler	Single trawler
Total Earnings	1 146 970	371 340	182 130	54 480
Running costs				
Fuel	93 210	98 880	37 050	11 760
Lubricant				
Harbour dues	7 390		140	50
Ice / salt			5 220	
Total running costs	100 600	98 880	42 410	11 810
Labour charges				
Labour share, wages	117 030	46 140	99 030	27 200(1)
Total labour charges	117 030	46 140	99 030	27 200
Vessel costs				
Gear expenses	55 410	38 150	2 490	1 040
Repairs and maintenance	119 200	39 440	2 420	1 160
Vessel insurance			4 830	840
General expenses	20 830	41 260	11 450	6 260
Total vessel costs	195 440	118 850	21 190	9 300
Total costs / expenses	413 070	263 870	162 630	48 310
Gross cash flow	733 900	107 470	19 500	6 170
Depreciation (1)	224 000	32 500	18 800	3 500
Interest (2)	98 600	14 300	8 300	1 500
Net cash flow	411 300	60 670	-7 600	1 170

(1) Estimate

(2) Average amount for repayment on 10 year loan 80 percent of investment. Interest rate eight percent

Type of vessel	Jigger	Set netter	Stow netter
Total Earnings	1 092 780	155 170	100 020
Running costs			
Fuel	240 730	16 570	11 500
Lubricant			
Harbour dues	3 840	2 410	2 410
Ice / salt		7 370	7 530
Total running costs	244 570	26 350	21 440
Labour charges			
Labour share, wages	79 330	49 500	53 860
Total labour charges	79 330	49 500	53 860

Vessel costs	Jigger	Set netter	Stow netter
Gear expenses	60 840	29 030	18 870
Repairs and maintenance	38 320	4 990	7 420
General expenses	101 180	7 290	7 050
Total vessel costs	200 340	41 310	33 340
Total costs / expenses	524 240	117 160	108 640
Gross cash flow	568 540	38 010	-8 620
Depreciation	256 000 (1)	3 300 (1)	7 000 (1)
Interest	112 600 (2)	1 300 (2)	3 100 (2)
Net cash flow	199 940	33 410	-18 720

(1) Estimate

(2) Average amount for repayment on 10 year loan 80 percent of investment. Interest rate eight percent.

1.2 Taiwan Province of China

Taiwan operates two types of tuna fishing vessels, i.e. longliners and purse seiners. The Taiwan study covers the fleet of Taiwanese purse seiners; 42 vessels operating in Papua New Guinea and in Micronesian waters.

Financial and economic characteristics of individual fishing units (in US\$)

Type of vessel	Purse seiner (1000 GRT)
Total Earnings	3 859 880
Running costs	
Fuel	562 500
Harbour dues	93 750
Ice / salt	37 500
Food	187 500
Other running costs	168 750
Total running costs	1 050 000
Labour charges	
Labour share, wages	506 250
Social insurance	37 500
Total labour charges	543 750
Vessels costs	
Gear expenses	187 500
Repairs and maintenance	375 000
Vessel insurance	75 000
General expenses	487 500
Total vessel costs	1 125 000
Total costs / expenses	2 718 750
Gross cash flow	1 141 130
Depreciation	380 000
Interest	182 500
Net cash flow	578 630



Purse seiners at fisheries training center, Republic of Korea

1.3 Republic of Korea

Fishing fleet

Type of fishing	Number of vessels		Main Species
	Main	Auxiliary	
Offshore stow netting	806	-	Hairtail, corvine
Offshore jigging	827	-	Squid
Large purse seining	48	279	Mackerel, jack mackerel
Anchovy mid-water trawling	110	578	Anchovy
Large bottom/ mid-water trawling	99	-	Squid, hairtail
Large bottom/mid-water pair trawling	384	-	Corvine, croaker
Danish seining	186		Corvine, croaker Flounder, sea eel Alaska pollack
Eastern Sea Bottom trawling	40		Alaska pollack, Shrimps
TOTAL = 3 357	2 500	857	

Fishing areas

- Offshore stow netting: Yellow Sea and East China Sea,
- coastal stow netting: near the shore of Yellow Sea,
- offshore jigging: mainly East Sea, partially Yellow Sea in about 400 n mi (nautical miles) from harbour,
- large purse-seining: all along the coast, from coastal waters to 300 n mi from shore, including East China Sea,
- anchovy mid-water trawling: from coastal waters up to 100 n mi from shore,
- large bottom/midwater trawling: around Cheju Island (Southern Sea) and East China Sea, within 200 n mi from shore,
- large bottom/midwater pair trawling: same area as above additional areas in Yellow Sea and East China Sea, fishing distance up to 400 n mi from shore,

- Danish seining: large vessels operate around Cheju Island, middle and south of East China Sea less than 250 n mi from harbour; middle size vessels operate in southern part of Yellow Sea, western part of Southern Sea less than 100 n mi from harbour and coastal part of Eastern Sea,
- Eastern Sea bottom trawling: coastal part of Eastern Sea less than 50 n mi from harbour.

Age structure of fleet

Type of fishing	Number of vessels	Age (in years)				
		<5 years	6-10	11-15	16-20	21 and over
Offshore stow netting	806	68	206	209	282	41
Offshore jigging	827	275	209	145	133	65
Large purse seining	327	43	57	40	48	139
Anchovy midwater trawling	688	111	290	88	97	102
Large bottom/midwater single trawling	99	58	7	10		24
Large bottom/midwater pair trawling	384	81	38	42	26	197
Danish seining	186	31	29	23	5	98
Eastern Sea bottom trawling	40	2	7	9		22
Total	3 357	669	843	566	591	688

Plans for future development of fleet

There is little potential for development of new fishing areas, in coastal areas or offshore. Almost all types of fishing gears, equipment and fishing vessels have been operated in the Republic of Korea since the 1970s. Almost all existing resources are fully exploited.

The Korean Ministry of Maritime and Fisheries Affairs, through the Law of Fisheries Industry, controls the fishing effort. Recently, the Ministry has stopped issuing new fishing licences and has also forbidden the replacement of old vessels by larger ones in order to conserve the fishery resources.

Techno-economic and operational characteristics of individual fishing units

Type of vessels	GRT average	KW Average	On board facilities/processing and storage	Fishing gear	Crew	Sharing system
Offshore stow netting	84.3	276		3 sets of nets	9	Minimum wages + share
Offshore jigging	52	248	Freezer storage = 100 m ³ + 28 t/day	300-900 hooks	13	"
Large purse seining	133	664	255 m ³	Seine 900-1000 m X200-300 m	80	Fixed wages + share
Anchovy mid-water trawling	33,6	262		Trawl 700 m	56	Fixed wages
Large bottom/mid-water trawling	135	814	172 m ³ + 50 t/day	Trawl HR 34-48 m	15	Fixed wages + share
Large bottom/mid-water pair-trawling	106	448	130 m ³ + 22 t/day	Trawl HR 54-114 m	22	"
Large Danish seining	130	284	190 m ³	Seine HR 50-104 m	8	Minimum wages + share
W-South Sea Middle Danish seining	100	"	130 m ³	"	9	"
Eastern Sea Middle Danish seining	60	"	80 m ³	"	10	"
Eastern Sea Trawling	65	321		Trawl HR 27 - 31 m	8	"

Type of vessel	Fishing days	Average duration of fishing trips	Fishing seasons (Off-seasons)
Offshore stow netting	180	240	All year
Offshore jigging	150	180	"
Large purse seining	240	270	"
Anchovy mid-water trawling	180	180	Jul-Mar (Apr-Jun)
Large bottom/mid-water trawling	240	270	All year
Large bottom/mid-water pair-trawling	240	270	"
Large Danish seining	180	210	"
W-Southern Sea middle Danish seining	210	240	"
Eastern Sea middle Danish seining	180	180	"
Eastern Sea trawling	180	180	"

Financial and economic characteristics of individual fishing units

Investment costs (in US\$)

Investments	Hull (1)	Engine and propulsion (1)	Deck equipment and others	Fishing gears	Total value
Depreciation rate	4 %	10 %	10 %	20 %	
Type of vessel					
Offshore stow-netting	151 710	75 850	12 500	55 630	295 690
Offshore jigging	231 410	115 710	18 580	75 670	441 370
Large purse seining	3 143 450	1 571 730	938 350	386 260	6 039 790
Anchovy mid-water trawling	440 830	220 420	177 350	203 650	1 042 250
Large bottom/ mid-water trawl	1 051 500	525 750	39 100	78 540	1 694 890
Large bottom/ mid-water pair trawling	408 540	204 270	40 030	110 510	763 350
Large Danish seining	58 050	29 030	28 680	21 670	137 430
W-Southern Sea middle Danish seining	241 930	120 970	17 750	29 370	410 020
Eastern Sea middle Danish seining	127 780	63 890	19 960	17 020	228 650
Eastern Sea trawling	188 890	94 440	33 040	20 670	337 040

(1) LEI - DLO Breakdown assumption Hull = 2/3 Engine = 1/3

Economic and financial performances of individual fishing vessels (in US\$)

Type of vessel	Offshore Stow-netting	Offshore Jigging	Eastern Sea trawling
Total earnings	412 710	424 920	313 270
Running costs			
Fuel	39 430	50 560	38 010
Harbour dues	41 280	20 650	23 200
Total running costs	80 710	71 210	61 210
Labour charges			
Labour share, wages	150 050	171 320	103 500
Other labour charges	29 940	21 440	58 470
Total labour charges	179 990	192 760	161 970
Vessel costs			
Gear expenses	46 630	17 690	13 080
Repairs and maintenance	32 070	23 410	26 360
General expenses	14 130	16 800	8 070
Total vessel costs	92 830	57 900	47 510
Total costs / expenses	353 530	321 870	270 690
Gross cash flow	59 180	103 050	42 580
Depreciation	26 030	37 820	24 440
Interest (1)	10 800	16 100	12 300
Net cash flow	22 350	49 130	5 840

(1) Average amount for repayment on seven year loan 80 percent of investment.
Interest rate eight percent.

Type of vessel	Large Purse seining	Anchovy midwater trawler	Large bottom single trawler	Large bottom pair-trawler
Total Earnings	5 119 510	1 466 710	1 890 980	1 472 110
Running costs				
Fuel	566 490	161 110	158 320	213 300
Harbour dues	790 600	139 080	173 660	139 830
Total running costs	1 357 090	300 190	331 980	353 130
Labour charges				
Labour share, wages	1 628 780	512 160	364 300	378 040
Other labour charges	486 030	94 260	114 240	134 180
Total labour charges	2 114 810	606 420	478 540	512 220

Type of vessel	Large purse seining	Anchovy midwater trawler	Large bottom single trawler	Large bottom pair trawler
Vessel costs				
Gear expenses	234 150	103 940	70 900	78 440
Repairs and maintenance	400 940	101 480	151 000	222 790
General expenses	32 679	68 330	57 550	69 230
Total vessel costs	961 880	273 750	279 450	370 460
Total costs / expenses	4 433 780	1 180 360	1 089 970	1 235 810
Gross cash flow	685 730	286 350	801 010	236 300
Depreciation	454 000	98 140	114 250	62 870
Interest (1)	220 900	38 100	62 000	27 900
Net cash flow	10 830	150 110	624 760	145 530

- (1) Average amount for repayment on seven year loan 80 percent of investment.
Interest rate eight percent.

Type of vessel	Large Danish seining	W-S Sea middle Dan. seining	E-Sea middle Dan. seining
Total Earnings	411 950	424 100	313 270
Running costs			
Fuel	22 550	53 720	20 920
Harbour dues	32 260	34 770	21 030
Total running costs	54 810	88 490	41 950
Labour charges			
Labour share, wages	119 290	125 660	149 500
Other labour charges	29 540	27 250	45 210
Total labour charges	148 830	152 910	194 710
Vessel costs			
Gear expenses	13 540	28 450	8 540
Repairs and maintenance	49 280	22 340	21 260
General expenses	15 940	23 930	8 430
Total vessel costs	78 760	74 720	38 230
Total costs / expenses	282 400	316 120	274 890
Gross cash flow	129 550	107 980	38 380
Depreciation	12 430	29 420	16 900
Interest (1)	5 000	15 000	8 400
Net cash flow	112 120	63 560	13 080

- (1) Average amount for repayment on seven year loan 80 percent of investment.
Interest rate eight percent.

Financial services available to fisheries sector

The Central Federation of Fisheries Cooperatives is a specific credit institution available for the Fisheries Sector. Deposit and loan conditions differ little from those of commercial banks, but it provides some interest rate discounts to its members. In case of natural disasters, loans of up to the equivalent of US\$ 12 500 are provided interest free. In addition to loans for fishing craft and gear, loans in the range US\$ 125 000 to 250 000 are available for construction of landing sites and fishing ports. Repayment periods range from: 5 to seven years after a two or three year grace period. The average rate of interest is 5 to 8 percent.

All fuel consumed by fishing vessels is tax-free.

1.4 India

Fishing fleet, small/medium-scale coastal fishing

State	Traditional craft		Mechanized boats	Total
	Unpowered	Powered		
Gujarat	8 825	3 730	5 294	17 849
Maharashtra	8 927	244	7 661	16 832
Karnataka	11 670	190	3 730	15 590
Tamil Nadu	14 763	11 374	3 742	29 879
Andhra Pradesh	28 539	5 152	5 426	39 117
Orissa	48 645	1 688	4 082	54 415
West Bengal	13 488	1 142	1 118	15 748
Lakshadweep	4 091	270	1 880	6 241
Andaman and Nicobar islands	447	298	415	1 160
Pondicherry	840	124	184	1 148
Goa	4 950	355	466	5 771
Others	1 100	900	850	2 850
TOTAL	146 285	25 467	34 848	206 600



Traditional gillnetters, India



Shrimp trawler, India



Traditional Kattumaram (fishing raft), India

Large-scale fishing fleet

The fleet consists of 180 Indian vessels, mostly shrimp trawlers, which are operated off Vishakhapatnam. There are also 30 chartered foreign vessels, i.e. 12 tuna longliners, 13 stern-trawlers and five pair trawlers which operate in the Indian EEZ.

Fishing areas

Most of the fishing activities are concentrated in the area within 40 fathoms depth. At present, there is no offshore fishing in India except for deep sea lobsters and deep sea prawns. Some trawlers, however, are trying to diversify towards tuna and cuttlefish.

Fisheries legislation and regulations

Since 1981, India has managed the exploitation of its marine resources up to 200 n mi from shore. This includes the control of foreign fishing vessels operating in the Indian EEZ (30 ships in 1994).

Large vessels may fish inside the Indian EEZ:

- along the East Coast, beyond 12 n mi from the coast;
- along the West Coast, beyond 24 n mi from the coast.

Specific restrictions have been laid down to protect shrimp grounds, in particular.

- along the Upper East Coast, around Sand-Heads;
- along the South West Coast, off Quilon.

Plans for future development of fleet

In the past, national rules and regulations were not well respected by chartered foreign vessels and traditional fishers urged the Indian Government to reconsider its Policy between 1986 and 1991. The Murari Committee was set up in 1995 and recommended:

- Cancellation of fishing permits to joint ventures, chartered or leased foreign vessels;
- modernization of traditional fishing vessels;
- introduction of more fishing vessels longer than 20 m.

These recommendations were incorporated in the IXth Five-Year Plan as follows:

- Upgrading of fishing capabilities of existing mechanized vessels (below 20 m LOA) by providing them with navigational aids (GPS, fish finders, communication equipment, etc.) and increasing their fish hold capacity.
- Introduction of intermediate range of fishing vessels (15-19 m LOA) with capacity to fish in depths of 70-150 m (or even up to 200 m). These vessels would be a combination of trawlers, longliners, purse seiners, etc.
- Diversification of existing trawlers (wherever there is extra fishing pressure) to long liners, purse seiners, squid jigging, etc.

- Continuation of assistance for procurement of patrol boats.
- Motorization of traditional craft with outboard or inboard motors including the gear component, particularly for States with weaker response to the ongoing schemes.
- Introduction of new hull materials such as FRP and Ferrocement for fishing vessels.
- Provision of central excise duty exemption on HSD oil supplied to vessels of below 20 m LOA.

In addition, the numbers of new types of fishing vessels to be introduced have been calculated from MSY estimations as follows:

- For improved exploitation of demersal resources: 511 25-35 m trawlers with the following distribution: West Coast: 390, East Coast : 94, Wadge bank and the Gulf of Mannar: 27;
- for improved exploitation of oceanic pelagic resources: 95 to 100 vessels, e.g. 30-35 m tuna longliners. with the following distribution: S-W Coast: 20. lower East Coast, Andaman and Nicobar islands: 75-80.

Techno-economic and operational characteristics of individual fishing units

Type of vessel	Length (m)	KW	On-board facilities / storage	Fishing gear	Crew	Ownership	Fishing days
Stern trawler	14.6	108	Ice + insulated Fish hold (10 t)	6 trawls	8	Individual	240
Tuna longliner	36	590	Freezer storage 4T X -55°C 110 m ³ X -50°C	Spare hooks and lines (2 000 hooks/days)	17	Company	240
Purse seiner (43 ft) Karnataka	13	108	Ice + insulated fish-hold	1 seine (300 m X 30 m)	16/18	Company	100 (Oct. to Feb).

Sharing systems

Stern trawler 14.6 m: crew of eight seamen / 240 days fishing.

- Basic wages: skipper (1) = US\$1 143
deckhands (7) = US\$286 (each)
- Share: 30 % of income (total earnings less fuel expenses = US\$15 822
- Total share and wages: US\$18 965 = 28 % of total earnings

Tuna longliners 36 m: crew of 17 seamen / 240 days fishing.

- Basic wages : skipper (1), engineer (1), mate (1), engine driver (1), cooks (2), oil men (2), deckhands (8), topass (1) = US\$98 825
- Sea allowance for 240 fishing days = US\$4 571
- Share: 40 % of income (total earnings less fixed and variable costs) = US\$176 571
- Total share and wages = US\$279 967 = 37 % of total earnings

Purse seiner 13 m (Karnataka State) crew of 16/18 seamen / 100 days fishing

- Share: 24 % of income (total earnings less fuel and lubricant expenses)
- = US\$8 240 = 23 % of total earnings.

Financial and economic characteristics of individual fishing units.

Investment costs (in US\$)

Investments	Hull	Deck equipment	Engine and propulsion	Fishing gear	Total value
Depreciation rate	4 %	10 %	10 %	20 %	
Type of vessel					
Stern-trawler 14 m	31 750	6 980	10 760	3 970	53 460
Tuna longliner 36 m	793 650 (1)			47 620	841 270
Purse-seiner (Karnataka) 13 m	27 300	1 910	8 950	9 520	47 680

(1) Includes deck equipment and engine / propulsion

Economic and financial performances of individual fishing vessels (in US\$)

Type of vessel	Stern trawler 14.6 m	Tuna longliner 36 m	Purse seiner 13 m
Total earnings	66 950	751 730	35 560
Running costs			
Fuel	14 800	73 600	1 420
Lubricant	1 430	3 660	320
Harbour dues	320	1 590	320
Ice	1 430		320
Food	1 710	4 510	
Costs of selling fish	1 020	44 820	1 780
Other running costs		11 270	
Total running costs	20 710	139 450	4 160
Labour charges			
Labour share, wages	18 970	279 970	8 240
Total labour charges	18 970	279 970	8 240
Vessel costs			
Gear expenses	1 310	1 590	3 170
Repairs and maintenance	2 820	16 670	2 480
Vessel insurance	1 140	11 900	950
General expenses	1 110	4 440	1 270
Total vessel costs	6 380	34 600	7 870
Total costs / expenses	46 060	454 020	20 270
Gross cash flow	20 890	297 710	15 290
Depreciation	3 840	58 400	3 790
Interest	(1) 4 230	(1) 66 630	(1) 3 780
Net cash flow	12 820	172 680	7 720

(1) Average amount for repayment on ten year loan 80 percent of investment.
Interest rate 18 percent.

Volume, composition and value of catches for three types of selected vessels

Type of vessel	Stern Trawler			Tuna Longliner			Purse seiner		
	14.6 m Wood			36 m			13 m (Karnataka)		
Catches (per year)	Weight (kg)	Price S/kg	Revenue (S)	K	P	R	K	P	R
1 - Shrimps									
Tiger shrimp	480	12.0	5 760						
White shrimp	2 400	8.2	19 680						
Other shrimp	6 880	3.5	24 080						
Fish									
Prime fish	2 000	1.27	2 540						
Other fish	32 000	0.48	15 360						
	43 760		67 420						
2- Yellowfin tuna				159 500	3.75	598 120			
Bigeye tuna				2 000	5.7	11 400			
Skipjack				200	0.6	120			
Sailfish, marlin				15 000	3.3	49 500			
Shark				53 000	1.75	92 750			
Other				400	0.6	240			
				230 100		752 130			
3- Mackerel							40 000	0.48	19 000
Sardine							100 000	0.16	16 000
Other									600
							140 000		35 600

Return on investment

Type of vessel	Stern trawler	Tuna longliner	Purse seiner
	14.6 m	36 m	13 m
Invested capital	53 460	841 270	47 680
Net cash flow	12 820	172 680	7 720
Return on investment	24.0 %	20.5 %	16.2 %

Financial services available to fisheries sector

The National Bank for Agriculture and Rural Development (NABARD) provides refinancing through commercial banks, cooperative banks and RRBs for development of marine fisheries.

Other agencies providing credit for marine sector are:

- Industrial Finance Corporation of India (IFCI)
- Industrial Development Bank of India (IDBI)
- Shipping Credit and Investment Corporation of India (SCICI)
- Industrial Credit and Investment Corporation (ICIC)
- National Cooperative Development Corporation (NCDC)
- State Finance Corporations (SFCs)

Institutional credit is available for:

- Traditional craft and gear;
- mechanized vessels;
- motorization of fishing vessels;
- offshore fishing vessels (purse seiners, trawlers, longliners, etc.);
- processing plants;
- cold storage;
- ice plants;
- retail shops;
- refrigerated vans.

Terms of finance

NABARD prepares guidelines for formulation of projects and assistance to financing banks.

- Borrowers: any individual, cooperative, corporation, private company etc. can submit a project to any bank. The financing bank, after appraisal, submits the same to NABARD for refinancing assistance.
- Loans: Contribution of borrowers: five to 25 percent.

For large amounts (more than US\$6 350), contribution is more than 20/25 percent. Subsidies, if any, are reckoned towards this contribution.

Amounts and rates:

	Commercial banks	RRBs	SCBs
Up to US\$800	8.5 to 12 %	6.5 %	6.5 %
From US\$800 to 6 350	10.5 to 13.5 %	9.5 %	9.5 %
Above US\$6 350	Commercial rate less 3 % to commercial rate	12.0 %	12.0 %

Security: mortgage on financed assets

Repayment period: usually four to ten years.

Capital subsidies:

In Karnataka State, a subsidy of Rs. 100 000 is available, in principle, for building multipurpose vessels.

MPEDA provides subsidies to offshore fishing vessels.

1.5 Malaysia

Fishing fleet

The Malaysian fishing fleet consists of two units, i.e.:

- Coastal or inshore fisheries include boats of less than 70 GRT operating within 30 nautical miles; they account for 87 % of total marine landings in Malaysia.
- Deep-sea fisheries include boats of 70 GRT and above operating beyond 30 nautical miles; they account for 13 % of total marine landings.

Five main types of fishing boats were used in Malaysia in 1995:

				tonnes
Otter trawl	5 991	Units in operation	Landing	609 298
Purse seine	953	"	"	156 826
Drift and gillnets	19 296	"	"	150 207
Hooks and lines	3 989	"	"	41 888
Portable traps (Bubu)	666	"	"	9 110
Total	30 895	"	"	967 329

Fishing areas

Inshore fisheries are located within the three following zones:

Zone A: 5 n mi from shore

Zone B: 5 to 12 n mi

Zone C: 12 to 30 n mi

- Deep Sea fisheries take place beyond the 30 n mi limit.

- 70 % of the fishing vessels are operated from Peninsular Malaysia.

- 30 % are operated off Sabah and Sarawak coasts

Plans for future development of fleet

The Government acknowledges that inshore fisheries are already heavily exploited and that in this sector any attempt to increase fishing effort should be avoided. Special emphasis is given to proper management of existing resources.

Deep-sea fisheries are seen to have further potential for development. Since 1980, Malaysian waters expanded from 47 000 n mi² to 162 000 n mi², but offshore fisheries were not developed. This is the reason why the Government assumes there is still considerable potential for further development. As this kind of activity requires large capital investment, the corporate sector is expected to take an active role in its growth. Also aquaculture shows bright prospects for expansion.

The Government of Malaysia - through its Department of Fisheries - has started promoting the development of offshore fisheries and commercial aquaculture while maintaining a sustainable level of production for inshore fisheries.

Techno-economic and operational characteristics of individual fishing units

Type of vessel	Tonnage (GRT)	Crew size	Fishing trips/year
Trawler (otter trawl)	20 - 40	3 - 4	15 - 16
Purse seiner	20 - 40	14 - 15	14 - 15
Drift or gillnetter	5 - 10	1 - 2	19 - 20
Handliner	5 - 10	2 - 3	18 - 19
Portable traps	5 - 10	2 - 3	11 - 12

Sharing system

Gross revenue - operation costs = net profit

Owners share = 50 % of net profit

Crew share = 50 % of net profit

including:

- Captain's share
- Wages - other key positions
- Wages - ordinary crew

Financial and economic characteristics of individual fishing units (in US\$)

Investment	Hull (1)	Engine and propulsion	Deck equipment	Fishing gear	Total
Depreciation rate	10 %	10 %	10 %	20 %	
Trawler (30 - 40 GRT)	41 480	22 590	12 520	6 130	82 720
Purse seiner (30 - 40 GRT)	37 410	15 810	7 850	12 300	73 370
Drift or gillnetter (5 - 10 GRT)	11 110	3 700	1 850	3 700	20 360
Handliner (5 - 10 GRT)	11 410	6 200	3 780	390	21 780
Portable traps (5 - 10 GRT)	11 110	6 200	4 070	2 590	23 970

(1) Assumed depreciation rate for traditionally built wooden hull = 10 %

Economic and financial performance of individual fishing vessels (in US\$)

Type of vessel	Trawler (30 - 40 GRT)	Purse seiner (30 - 40 GRT)	Drift or gillnetter (5 - 10 GRT)	Handliner (5 - 10 GRT)	Portable traps (5 - 10 GRT)
Total earnings	62 450	116 730	7 160	19 300	12 300
Running costs					
Fuel	19 470	17 360	1 470	3 440	2 400
Ice / salt	4 100	13 100	490	1 520	1 200
Other running costs	3 190	10 740	650	1 600	1 150
Total running costs	26 760	41 200	2 610	6 560	4 750
Labour charges					
Total labour charges	12 950	35 210	1 040	4 300	2 300
Vessel costs (1)	10%	15%	5%	3%	5%
Total vessel costs (1)	6 240	17 500	360	580	610
Total costs / expenses	45 950	93 910	4 010	11 440	7 660
Gross Cash Flow	16 500	22 820	3 150	7 860	4 640
Depreciation	8 890	8 570	2 410	2 220	2 660
Interest (2)	2 910	2 580	720	770	840
Net Cash Flow	4 700	11 670	20	4 870	1 140

(1) Estimate: proportion of earnings

(2) Average amount for repayment on ten year loan 80 percent of investment value.
Interest rate eight percent.

1.6 Indonesia

Artisanal fishing: (Indonesian EEZ)

Non- powered boats: 61 %	245 162
- Dugout canoes	127 936
- Plank boats	117 226
- Small	73 392
- Medium	37 139
- Large	6 695



Purse seiners, Indonesia



Trawler, Indonesia

Powered boats: 39 %	159 491
- Outboard powered boats : 25 %	94 024
- Inboard powered boats: 16 %	65 467
<5 GRT	48 855
5 - 10 GRT	9 562
10 - 20	2 789
20 - 30	1 519
30 - 50	1 682
50 - 100	687
100 - 200	253
>200	120
Subtotal	404 653

Industrial fishing (international waters) 1 674

TOTAL No. of fishing vessels 406 327

Fishing areas

The major fishing areas and the fishing carried out throughout Indonesian waters are:

Java Sea, west coast of Jakarta	Gillnetters < 30 GRT	150 n mi
Java Sea, central coast	Purse seiners 20-50 GRT	20 - 30 n mi
Pekalongan	Purse seiners 50 - 100 GRT	50 - 60 n mi
Java Sea, Makassar Strait "	Purse seiners > 100 GRT	> 100 n mi
South China Sea		
Pekalongan		
Indian Ocean,	Longliners 15/40/60/100 GRT	South of Java and Bali
Benoa, Bali-Nusa Tenggara		
North Sulawesi and Obi Strait (N. Maluku)	Tuna handliners 3 - 5 GRT	Coastal fishing
Gorontalo and Labuha		
Obi Strait (N. Maluku)	Pole and liners 10 GRT	Coastal fishing
Labuha		
Waigeo island and Arafura sea (W Irian Jaya)	Pole and liners 30 GRT	20 - 100 n mi
Sorong, Fakfak, Kaimana		

Plans for future development of fleet

While the MSY has been estimated by Indonesian Directorate General of Fisheries at a level of 6.72 million tonnes / year, to compare with actual landings of 3.29 million tonnes (49 % of the total resource potential), many fishing areas are reported to be fully or overexploited:

- *Fully exploited resources:* Penaeid stock (Java Sea), Spiny lobster stock (Indian Ocean)
- *Overexploited resources:* small pelagic fish (Malacca strait and Java Sea), demersal fish stocks (Malacca strait, Java Sea, Makassar Strait, Flores Sea, Seram Sea, Tomini bay, Celebes Sea, Pacific Ocean).

Future development of marine capture fisheries can only be considered if alternative fishing grounds are found and explored further offshore, especially in Eastern Indonesia. The introduction of more efficient management measures is urgently needed.

Techno-economic and operational characteristics of individual fishing units

Type of vessel	Length (m)	Tonnage (GRT)	KW	On board facilities / storage	Fishing gear	Crew Size	Ownership
Purse seiners							
Small	17	15	2 x 17 (outboard)	Fishhold (9t)	Purse seine 250 / 300 x 40 m	21	Individual
Medium	18	54	59	Ice, salt + fishhold (13 t)	400 / 600 x 60m	34	Company
Large	25.5	114	171	Ice, salt + fishhold (60 t)	600 / 800 x 80 m	44	Company
Skipjack Pole and liner							
Small	16	10	33	Ice + fishhold (4 t)	10 poles	20	Individual
Large	22.2	30	177	Ice + fishhold (20 t)	20 poles	23	State owned company
Tuna Handliner	13	5	11 - 18	Ice + fishhold (2 t)	Line (60/100 m)	4	Individual

Type of vessel	Length (m)	Tonnage (GRT)	HP (KW)	On-board facilities / storage	Fishing gear	Crew size	Ownership
Tuna Longliners							
15 GRT	14.5	15	77	Ice + fishhold (4.6 m ³)	Hooks 700	11	State-owned company
40 GRT	18.8	40	177	" (32 m ³)	Hooks 1 200	13	"
60 GRT	23.4	60	177	" (41 m ³)	1 500	13	"
100 GRT	27.8	100	295	" (125 m ³)	1 500	19	"
Gillnetter	12.3	5.5	25	" (3.8 t)	Pieces of nets 60	7	Individual

Type of vessel	Fishing days	Average duration of fishing trips	Fishing seasons (and off-seasons)
Purse seiners			
Small	149	1 day	May-Jul and Aug-Dec (Jan-Mar)
Medium	155	17 days	"
Large	164	21 days	"
Skipjack pole and liners			
Small	150	1-2 days	9 month-peak Sept-Nov (Dec-Jan)
Large	205	5 days	"
Tuna handliner	132	1-2 days	
Tuna longliners			
15 GRT	254	15 days	Jul-Dec (Jan-Mar)
40 GRT	278	"	"
60 GRT	265	"	"
100 GRT	283	35 days	"
Gillnetter	276	14 days	Feb-Sep (Oct-Jan)

Financial and economic characteristics of individual fishing units

Investment costs (in US\$)

Investment	Hull	Fishhold	Deck equipment	Engine and propulsion	Fishing gear	Total
Depreciation rate	4 %	4 %	10 %	10 %	20 %	
Type of vessel						
Purse seiners						
Small	15 450	2 580	20	3 080	12 170	33 300
Medium	30 040	16 310	1 290	6 050	31 490	85 180
Large	51 500	18 460	1 300	7 430	35 410	114 100
Skipjack pole and liners						
Small	3 860		40	20 170	90	24 160
Large	62 230		1 720	40 770	100	104 820
Tuna handliner	2 150		20	5 360	30	7 560
Tuna longliners						
15 GRT		(not available)				
40 GRT		"	"			
60 GRT	429 180				85 840	515 020
100 GRT		(not available)				
Gillnetter	15 020		60	7 330	3 220	25 630

Economic and financial performances of selected fishing vessels (in US\$)

Type of vessel	Purse seiner 17 m	Purse seiner 18 m	Purse seiner 25.6 m	Tuna longliner 23.4 m
Total Earnings	25 430	62 030	85 700	203 150
Running costs				
Fuel	2 460	22 360	27 570	21 040
Lubricant		490	530	2 100
Harbour dues	260	730	900	4 280
Ice / salt	910	3 330	4 640	970
Food	980	5 670	6 780	5 950
Costs of selling fish	1 270	3 100	4 280	
Other running costs		20	30	18 450
Total running costs	5 880	35 700	44 730	52 790
Labour charges				
Labour share, wages	4 980	5 500	9 220	11 800
Social insurance	510	1 240	1 710	3 480
Other labour charges	1 270	3 100	4 280	22 910
Total labour charges	6 760	9 840	15 210	38 190
Vessel costs				
Gear expenses	330	620	730	4 500
Repairs and maintenance	590	980	1 070	18 470
General expenses		630	660	420
Total vessel costs	920	2 230	2 460	23 390
Total costs / expenses	13 560	47 770	62 400	114 370
Gross cash flow	11 870	14 260	23 300	88 780
Depreciation	3 470	8 890	10 750	(est) 45 000
Interest (1)	2 050	5 250	7 030	31 720
Net cash flow	6 350	120	5 520	12060

- (1) Average amount for repayment on ten year loan 80 percent of investment.
Interest rate 14 percent.

Type of vessel	Gillnetter	Tuna handliner	Pole and liner 10 GRT	Pole and liner 30 GRT
Total Earnings	12 020	8 690	43 680	122 690
Running costs				
Fuel	2 220	1 170	3 170	13 260
Lubricant	260	140	410	970
Harbour dues	40	60	110	50
Ice	1 230	1 540	2 570	9 580
Food	2 310	820	3 400	2 930
Costs of selling fish	1 530			
Other running costs	50	540	10 600	15 980
Total running costs	7 640	4 270	20 260	42 770
Labour charges				
Labour share, wages	1 970	1 770	10 820	32 440
Total labour charges	1 970	1 770	10 820	35 080
Vessel costs				
Gear expenses	70	410	1 030	1 180
Repairs and maintenance	350	390	640	4 460
Vessel insurance				240
General expenses	20	80	100	670
Total vessel costs	440	880	1 770	6 550
Total costs / expenses	10 050	6 920	32 850	84 400
Gross cash flow	1 970	1 770	10 830	38 290
Depreciation	1 980	630	2 190	6 760
Interest (1)	1 580	470	1 490	6 460
Net cash flow	-1 590	670	7 150	25070

(1) Average amount for repayment on 10 year loan 80 % of investment. Interest rate 14%.

Financial services available to fisheries sector

In Indonesia there are no special institutional credit programmes for the fisheries sector, several general institutional credit sources are available:

- Small Investment Credit (KKI) for fishing vessels, engines, gears.
- General Rural Credit (KUPEDS) for any small-scale investment
- Credit for Primary Cooperatives Members (KKPA) for credit to members of fisheries cooperatives or cooperatives whose members are working in the fisheries sector.

Terms of finance:

Until 1996: Second Fisheries Industries Credit Project (FICP-II)

- Loan ceiling = US\$525 000 / enterprise
- Equity = 35 %
- Collateral required
- Rate = commercial terms
- Repayment = ten years



Traditional fishing canoes, Ghana

From now on: Small Enterprise Credit (SEC)

- Loan Ceiling US\$107 000 / client (KUPÉDES = US\$10 700)
- Collateral required
- Rate = commercial terms
- Maturity period = three years

Credit for Primary Coop members (KKPA)

- Loan ceiling = US\$21 500 / client
- No collateral required
- Rate = 14 % / year
- Repayment < 15 years including grace period

2. Africa

2.1 Ghana

Fishing fleet

Four main types of fishing fleets are operated along the 550 km coastline of Ghana, i.e.

- Inshore fishing: canoes and semi-industrial trawlers;
- offshore and oceanic fishing: industrial and tuna fishing fleets

Type of Fishing (1995)	Number of units in operation	Crew size	Fishing days per year	Power of engine (HP)
Artisanal canoes				
Poli-Watsa	3 748	15 - 30	150	40
Beach seine	158	20 - 80	200	40
Beach seine	632	20 - 40	200	-
Hook and line	868	5 - 6	240	40
Drifting gillnet	410	4 - 6	150	40
Bottom set gillnet	402	3 - 4	288	25
Semi-industrial vessels				
Trawlers	42	15 - 20	200	90 - 150
Purse seiners	115	30 - 35	150	90 - 150
Industrial fleet				
Tuna Pole and liners	33	30 - 35	224	400 +
Industrial trawlers	30	30 - 40	224	400 +
Industrial purse seiners	17	21 - 25	224	400 +
Shrimp trawlers	16	-	-	-

fishing area and species caught

Type of fishing	Distance or depth	Main species targeted
Artisanal canoes		
Poli-watsa	Up to 40 m	Small pelagics: anchovy, sardinella, mackerel
Beach seine	Up to 25 m	Anchovy, sardinella, scad burrito, moonfish, ribbonfish, shrimps
Hook and line	From 10 to 220 m	Seabream, snappers, groupers, chubmackerel, scad
Bottom line	From 10 to 30 m	Sea bream, threadfin guitarfish
Gillnets (drifting)	Trips 16 to 20 hours	Shark, tuna, marlin, sailfish, swordfish
Gillnets (bottom set)	10 to 50 m	Spiny lobster, shark, ray, cephalopods
Semi-industrial vessels	Purse seining during 3 months upwelling season (between June and October) Trawling in shallow waters rest of the year	
Industrial fleet		
Tuna pole and liners	Ghanaian waters	Skipjack, yellowfin, bigeye
Trawlers and purse-seiners	30 industrial trawlers in Ghanaian waters	Demersal fish
	17 purse seiners in foreign waters	Pelagic fish
	16 shrimpers	Prawns and demersal fish

Plans for future development of fleet

Regarding the potential for development of new fishing areas, at present, three types of fishery resources are exploited:

- Small pelagic resources by canoes and semi-industrial fleet
- Large pelagics (tuna) by tuna fleet
- Demersal fish: sea-brems, mullets, snappers, cuttlefish by large trawlers.

It is estimated that the total biomass for small pelagics ranges from 246 000 tonnes to 378 000 tonnes. Landings have recently dropped from 279 200 tonnes in 1992 to 158 000 tonnes in 1995 which indicates an overexploitation of this resource.

The MSY for skipjack tuna has been evaluated around 200 000 tonnes (ICCAT). Catches in the region range between 100 000 and 150 000 tonnes. For Ghanaian waters the potential yield has been estimated at 80 000 tonnes approximately while average landings reach 25 000 tonnes. It is felt that there is a possibility of increasing fishing effort on that resource provided that minimum size restrictions are applied.

The MSY for demersal fish has been estimated between 24 000 and 42 000 tonnes. As in 1990 average landings were around 63 000 tonnes, the demersal resources can be considered overexploited in the coastal area (<75 m depth). There might be further development opportunities in the area between 75 m and 100 m depth, for trawlers, provided they use appropriate gear.

Techno-economic and operational characteristics of individual fishing units

Type of vessel	Length (m)	Propulsion (KW)	Fishing gear	Crew size	Sharing rate	Fishing days	Fishing seasons
Artisanal canoes							
Poli / watsa canoe	12-18 m	29 Outboard	Purse seine 400-500 X 35-50 m	15-30	50 %	150	June-Sept.
Beach seine (Non motor.)			Beach-Seine 150 mX6 m	20-40	50 %	200	
" (motor)		29 Outboard	1800 m X22 m	40-80	50 %	200	
Hook & line	6-12 m	29 Outboard	10-12 lines	5-6	50 %	240	All year
Drifting gillnet		29 Outboard	Gillnet 100-450m X15-20 m	4-6	50 %	150	Peak Aug-Sept.
Bottom-set gillnet	6-11 m	18 Outboard	Gillnet 180 m X1.2-1.5 m	3-4	33 %	280	All year
Semi-industrial fleet							
Trawler	9-12 m	60-110	Trawl.		33 %	200	All year
Purse seincr	9-12 m	60-110	Purse seine		33 %	150	
Industrial fleet							
Tuna pole and liner	30 m	294+	Poles and lines	30-35	Daily wage	224	All year
Trawler (fish)	35 m	440+	Trawl	30-40	Daily wage	224	
Trawler (shrimp)	35 m	440+	Trawl		Daily wage	224	

Financial and economic characteristics of individual fishing units (in US\$)

Cost of investment

Investment	Hull	Engine and propulsion	Fishing gear	Total
Depreciation rate	15 % Art (1) 4 % Ind.	30 % outboard (2) 10 % inboard	20 %	
Type of vessel				
Artisanal				
Poli-watsa	3 750	Outboard 2 920	11 250	17 920
Beach seine (no motor)	830	-	3 330	4 160
Beach seine (motorized)	1 670	Outboard 2 920	5 420	10 010
Hook and line	1 670	Outboard 2 920	830	5 420
Drift gillnet	1 670	Outboard 2 920	2 500	7 090
Bottom-set gillnet	1 670	Outboard 1 670	1 670	5 010
Semi-industrial				
Trawler	8 330	Inboard 20 830	4 170	33 330
Purse seiner	8 330	Inboard 20 830	10 000	39 160
Tuna pole and liner				1 262 500
Industrial				
Trawler (fish)				1 262 500
Trawler (shrimp)				1 262 500

(1) Assumed depreciation rate for wooden canoes = 15 %

(2) Assumed depreciation rate for outboard motors = 30 %

Economic and financial performance (in US\$)

Type of vessel	Poli-watsa canoe	Beach seine canoe (no motor)	Beach seine canoe (motorized)	Hook and line canoe
Total earnings	35 660	8 010	17 260	24 320
Running costs				
Fuel	8 630		1 920	4 140
Ice				1 250
Other running costs				2 330
Total running costs	8 630		1 920	7 720
Labour charges				
Labour share, wages	13 520	4 010	7 670	10 090
Total labour charges	13 520	4 010	7 670	10 090
Vessel costs				
Gear expenses	560	170	270	40
Repairs and Maintenance	770	40	670	670
Total vessel costs	1 330	210	940	710
Total costs / expenses	23 480	4 220	10 530	18 520
Gross cash flow	12 180	3 790	6 730	5 800
Depreciation	3 690	790	2 210	1 290
Interest (1)	4 700	980	2 870	1 720
Net cash flow	3 790	2 020	1 650	2 790

- (1) Average amount for repayment on six year (canoe) and two year (outboard motor) loan 80 percent of investment value. Interest rate six percent.

Type of vessel	Drifting gillnet canoe	Bottom-set gillnet canoe	Semi-industrial trawler	Semi-industrial purse seiner
Total Earnings	17 540	10 680	37 340	34 760
Running costs				
Fuel	8 630	2 760	7 300	10 250
Ice			4 580	
Total running costs	8 630	2 760	11 880	10 250
Labour charges				
Labour share, wages	2 970	2 640	10 010	8 170
Social insurance				
Other labour charges				
Total labour charges	2 970	2 640	10 010	8 170
Vessel costs				
Gear expenses	120	80	420	1 000
Repairs and maintenance	670	420	2 920	2 920
Vessel insurance			1 460	1 460
Total vessel costs	790	500	4 800	5 380
Total costs / expenses	12 390	5 900	26 690	23 800
Gross cash flow	5 150	4 780	10 650	10 960
Depreciation	1 630	1 090	3 670	3 920
Interest (1)	2 140	1 410	5 910	5 960
Net cash flow	1 380	2 280	1 070	1 080

(1) Average amount for repayment on six year (canoe or boat) and two year (outboard motor) loan 80 percent of investment. Interest rate six percent.

Type of vessel	Tuna pole and liner	Industrial trawler (fish)	Industrial trawler (shrimps)
Total earnings	1 284 280	1 159 030	1 295 530
Running costs			
Fuel	326 170		
Ice / salt	126 580		
Food	11 720		
Total running costs	464 470		
Labour charges			
Labour share, wages	162 500		
Total labour charges	162 500		
Vessel costs			
Gear expenses	30 420		
Repairs and maintenance	62 500		
Total vessel costs	92 920		
Total costs / expenses	719 890		
Gross cash flow	564 390		
Depreciation	164 060		
Interest	(2) 130 590		
Net cash flow	269 740	(1) 144 500	(1) 281 000

(1) No detailed data available

(2) Average amount for repayment of six year loan 80 percent of investment.
Interest rate six percent.

Financial services available to fisheries sector

Informal Credit

Fish traders or moneylenders provide most of the credit to the fishing industry. The rate of interest is high, but repayment conditions are more flexible than in the case of institutional credit:

Rate of interest = 25 %

Repayment period: -Trawlers, ten years

- Canoe, seven years
- Inboard motors, eight years
- Outboard motors, three years
- Gears, three to seven years

In addition to the cost of interest, there is also a cost/charge for fishermen created by the links to credit made by fish traders and fish delivered at an agreed price. This is difficult to assess.

Institutional Credit

The Department of Fisheries initiated institutional credit in the late 1950's. The conditions were as follows:

- An equity contribution of 20 percent of the investment from the borrower payable to the Department of Fisheries;
- loan of 80 percent: of the cost of investment to be repaid in six years in the case of fishing boats and two years in the case of outboard motors;
- rate of interest: six percent per annum.

The Agricultural Development Bank of Ghana took over the function of providing credit to the fisheries sector from the Department of Fisheries and also acts as administering agency for external loans. In 1970, the Bank managed IDA's \$1.3 million credit (15 m purse-seiners). In 1983 and 1985, the Bank received \$15 million from the African Development Fund of which 60 percent was used for outboard motors and fishing gear. In 1986, the bank received a EDF \$7 million credit for rehabilitation of the inshore fleet. Currently, there is an on-going Fisheries Sector Capacity Building Project on-going which is financed by the World Bank.

2.2 Senegal

Fishing fleet

Industrial fishing

Fish preservation	Inshore		Offshore and oceanic	
	Pelagic	Demersal	Pelagic	Demersal
With ice	2 seiners	64 trawlers	5 longliners 5 pole and liners 29 seiners	6 trawlers
By freezing	8 trawlers (midwater)	69 trawlers	6 longliners 5 pole and liners 27 seiners	18 trawlers
TOTAL = 244	10	133	77	24

Artisanal fishing

Type of vessel	No. 1993
Purse seiners	344
Encircling gillnetters	72
Handliners	694
Multipurpose canoes (Handlines and/or gillnets and/or cuttle- fish and octopus traps and pots)	4 552
Total	5 662

Fishing areas

Three fishing zones from North to South can be distinguished:

- A: From Mauritania down to Cap Vert (Dakar)
- B: From Cap Vert peninsula down to North Gambia border (Petite côte)
- C: From North Gambia border down to Guinea-Bissau (Casamance)

Fishing areas restrictions : reserved areas

Industrial fishing

- Inshore pelagic fishing:
- Ice seiners up to 50 GRT beyond 3 n mi
- Ice seiners from 51 to 250 GRT A: beyond 3 n mi
B: - 12 n mi
C: - 3 n mi
- Ice seiners beyond 250 GRT A: beyond 12 n mi
B: - 12 n mi
C: - 6 n mi
- Freezing seiners A: beyond 12 n mi
B: - 25 n mi
C: - 6 n mi
- Midwater trawlers A: beyond 20 n mi

Inshore demersal fishing:

- Ice trawlers < 300 GRT A > 6 n mi
- Freezing trawlers < 250 GRT B > 10 n mi
- C > 6 n mi
- Ice trawlers > 300 GRT A > 12 n mi
- Freezing trawlers > 250 GRT B > 14 n mi
- C > 12 n mi

- Offshore demersal fishing:

- A > 12 n mi
- B > 25 n mi
- C > 35 n mi

- Offshore and oceanic pelagic fish:

- Tuna seiners and pole and liners allowed in any zone.
- Longliners fishing for swordfish
 - A > 15 n mi
 - B > 12 n mi
 - C > 20 n mi
- Longliners fishing for tuna
 - A > 25 n mi
 - B > 30 n mi
 - C > 50 n mi

Artisanal fishing**Inshore pelagic fishing**

- Purse seiners
- Encircling gillnetters
- Handliners
- Multipurpose canoes

Reserved areas

- A : within 3 n mi
- B : within 12 n mi
- C : within 6 n mi

Inshore demersal fishing

- Handliners
- Multipurpose canoes

A, B, C : within 6 n mi

Fishing areas have been delineated according to the different type and size of fishing vessel.

Other fisheries legislation and regulations

In 1987 a specific law has laid down restrictions related to:

- fishing power (vessels of > 1500 GRT are banned);
- fishing gears (essentially mesh-sizes);
- fishing rights (essentially licences);
- minimum sizes for fish.

Plans for future development of fleet

Industrial fishing

Large-scale fishing units commissioned in Dakar are rather old. The average age of ice-vessels is 24 years and for freezers 21 years. Regarding the future development of the fleet, the following recommendations have been formulated by the Fisheries Research Institute:

Inshore pelagic fishing

- Ban any increase of fishing effort for zone A
- Urge on moving towards zones B and C (vessels > 100 GRT)
- Reduce fishing effort of freezing mid-water trawlers and direct them towards offshore fishing.

Inshore demersal fishing

- Decrease of fishing effort back to a lower level than that of 1992;
- improve control of all fishing including small-scale fishing.

- Offshore demersal fishing

- Maintain fishing effort for prawns (optimum level);
- increase fishing effort for hake

- Offshore and Oceanic pelagic fishing

- Improve estimates of regional fishing opportunities;
- increase fishing effort on tuna adult population through longlining experiments.

Artisanal fishing

Inshore pelagic fishing

Reduce fishing effort for zone B

Inshore demersal fishing

Ban any increase of fishing effort.

Techno-economic and operational characteristics of individual fishing Units

Industrial fishing

Type of vessel	Length (m)	Tonnage (GRT)	KW	On board facilities / storage	Fishing gear	Crew size	Ownership
Coastal seiner	24-31	80	295	Ice + fishhold (50t)	seine (620-950m)	15-20	Company owned
Pelagic trawler	62 - 104	1 900 - 4 900	1 470 - 4 270	Freezing + storage 5700t	Trawl (150 - 480m)	25-30	Chartered vessel
Coastal trawler (demersal / ice)	27 - 49	120 - 480	295 - 1470	Ice + fishhold (66t)	Trawl (48m)	15-25	Company owned
Coastal trawler (demersal / freezer)	32 - 47	160 - 540	370 - 1990	Freezing 6t/day + storage : 100t	Trawl (60m)	20-25	Company owned
Deep sea trawler (ice)	27 - 39	120 - 390	295 - 920	Ice + fishhold (100t)	Trawl (72m)	13-22	Company owned
Deep sea trawler (Freezer)	27 - 38	120 - 415	570 - 1360	Freezing : 2t/day + storage 100t	Trawl (83m)	13-22	Company owned
Off-shore fishing (pelagic)							
Seiners	36 - 77	210 - 3730	730 - 2940	Freezing + storage 400 - 1000t	Seine (1 500m)	21-28	Company owned
Pole and Liner	20 - 45	80 - 380	220 - 730	Ice + fishhold (40 - 90t)	Poles and lines	17-33	Company owned
Longliner	20 -60	80-410	295 - 1100	Ice or freezing	Longlines 1500 - 3500 hooks	20-40	Company owned

Type of vessel	Fishing days	Average duration of fishing trips	Fishing seasons
Coastal seiner	78 / year	12 - 13 hours	All year
Pelagic trawler	270	3 months	"
Coastal trawler (demersal / ice)	101	5 days	Maximum Oct-June
Coastal trawler (demersal / freezer)	234	17 days	"
Deep sea trawler (ice)	203	6 days	"
Deep sea trawler (freezer)	240	40 days	"
Offshore fishing (pelagic)			
Seiner	120	40 days	Feb-May
Pole and liner	120	7 - 17 days	Nov-Feb
Longliner (ice)	180	15 - 20 days	
Longliner (freezer)	240	8 months	

Artisanal fishing

Type of vessel	Length (m)	Tonnage (GRT)	KW	On board facilities / storage	Fishing gear	Crew size	Sharing system
Purse seiners	12 - 22	12 - 20	59	Fishhold 12 - 20 t	Seine 200 - 270m X 42 - 48m	14 - 20	1/3 for the net 2/3 shared between crew, boat, engines
Encircling gillnetters	10 - 17	3 - 7	29	Fishhold 3 - 7 t	250 - 450m X 7 - 12m	8 - 12	1/3 crew 1/3 boat 1/3 engine
Handliners	9 - 22	2 - 4	59	Ice + fishhold	Handlines	11	"
Multipurpose canoes	8 - 13	0.5 - 1.7	11		Gillnets handlines traps	6 - 8	"

Type of vessel	Fishing days	Average duration of fishing trips	Fishing seasons
Purse seiners	20 -23 days per month	8 - 10 hours	All year (maximum Nov-May)
Encircling gillnetters	"	"	"
Handliners	3 trips per month	6 - 7 days	All year
Multipurpose canocs	28 days per month	8 - 10 hours	"

Financial and economic characteristics of individual fishing units

Industrial fishing

Investment costs

Deep sea trawler 22 m. Investments in US\$	Depreciation rate and amount	
Hull = 692 730	4 %	27 710
Engine and propulsion = 181 820	10 %	18 180
Deck equipment and safety = 63 640	10 %	6 360
Equipment for navigation, fish detection and communication = 23 640	10 %	2 360
Fish preservation and storage = 100 000	4 %	4 000
Fishing gear and equipment = 29 090	20 %	5 820
Total = 1 090 920		64 430

- Economic and Financial performance (in US\$)

Type of vessel	Deep Sea trawler 22 m / 316 KW Demersal Fish-Shrimps-Cephalopods
Total Earnings	462 360
Running costs	
Fuel	101 090
Harbour dues	4 630
Total running costs	105 720
Labour charges	
Labour share, wages	74 570
Total labour charges	74 570
Vessel costs	
Gear expenses	100 960
Repairs and maintenance	101 210
Vessel insurance	36 000
General expenses	45 840
Total vessel costs	244 010
Total costs / expenses	424 300
Gross cash flow	38 060
Depreciation	64 430
Interest	44 600 (1)
Net cash flow	70 970

(1) Average amount for repayment on 13 year loan 80 percent of investment.
Interest rate 9.5 percent.

Artisanal fishing

Investment costs

Investments in US\$	Hull	Engine and propulsion (outboard)	Deck equipment and others	Fishing gear	Total value
Depreciation rate	15 % (1)	30 % (2)	10 %	20 %	
Type of boat					
Purse seiner	7 640	6 470	1 180	12 140	27 430
Encircling gillnetter	3 270	3 240	470	3 040	10 020
- Handliner	3 270	3 240	120	300	6 930
- Multipurpose canoe	2 360	2 640	120	1 520	6 640

(1) Assumed depreciation rate for wooden canoes = 15 %

(2) Assumed depreciation rate for outboard motors = 30 %

Economic and financial performance (in US\$)

Type of vessel	Purse seiner	Encircling gillnetter	Handliner	Multipurpose canoe
Total earnings	71 930	26 630	30 180	12 540
Running costs				
Fuel	19 270	11 570	7 000	1 400
Ice			1 820	
Food	2 360	950	1 180	360
Other running costs	350	240	620	70
Total running costs	21 980	12 760	10 620	1 830
Labour charges				
Labour shares, wages	26 670	10 480	15 980	5 900
Total labour charges	26 670	10 480	15 980	5 900
Vessel costs				
gear expenses	3 040	760	80	380
repairs and maintenance	2 660	930	930	740
Total vessel costs	5 700	1 690	1 010	1 120
Total costs / expenses	54 350	24 930	27 610	8 850
Gross cash flow	17 580	1 700	2 570	3 690
Depreciation	3 200	1 510	1 470	1 160
Interest(1)	2 100	800	500	500
Net Cash Flow	12 280	- 610	600	2 030

- (1) Average amount for repayment on two year loan 80 percent of investment.
Interest rate 13 percent.

Financial services available to fisheries sector**Industrial Fishing**

Access of this category of fishing unit to institutional credit:

Four commercial banks are involved in financing the Fisheries Sector:

- Société Générale de Banque au Sénégal (SGBS)
- Banque Internationale pour le Commerce et l'Industrie au Sénégal (BICIS)
- Crédit Lyonnais du Sénégal
- Compagnie Bancaire de l'Afrique Occidentale (CBAO)

These Banks are supported, especially for this sector, by international institutions, i.e. the African Bank for development (ABD) through the Economic Promotion Fund, the Caisse Française de Développement (CFD) and the World Bank (APEX - Fund)

Terms of Finance

ABD - Economic Promotion Fund

Total amount 70.9 million US\$ on which 18.2 million are already undertaken.

- Loan = 70 % maximum of investment
- Repayment period 15 years maximum after five years deferring for capital repayment.

Caisse Française de Développement

Maximum amount / investment = 3.6 million US\$

- Repayment period 15 years maximum after five years deferring for capital repayment.
- Rate = 13.2 %

World Bank - APEX Fund.

- Maximum loan amount = 2.9 million US\$ and 80 % of investment
- Repayment period 13 years maximum after two years deferring for capital repayment
- Rate = 9.5 %

Artisanal Fishing

Access of this category of fishing unit to institutional credit:

- Caisse Nationale de Crédit Agricole du Sénégal (CNAS)

Support projects:

- Projet de développement de la pêche artisanale sur la Petite Côte (PAPEC) supported by ABD;
- Projet d'appui aux professionnels de la pêche artisanale en Casamance (PROPAC) supported by CFD and EDF;
- Projet d'appui aux Mutuelles d'épargne et de Crédit au Sénégal (PAMECAS) supported by Canadian coopération.
- NGOs

Terms of finance

- Loan = maximum 80 percent of investment
- Repayment period = 24 months
- Rate 13 percent
- Collateral requirements = guarantee and/or mortgage.

Tax exemptions

On fuel: (total amount in 1992: US\$22 million)

Price for fisheries: 1 litre = US\$0.30

3. Europe

3.1 France

Composition of fleet

No.	Size : length (m)	GRT	KW
1002	< 6	1 146	24 307
1776	6 - 8	4 704	87 624
1330	8 - 10	7 334	115 441
913	10 - 12	9 357	117 075
691	12 - 16	17 610	135 620
946	16 - 25	58 308	325 127
93	25 - 38	16 655	54 122
78	>38	63 859	151 331
6 829		178 973	1 010 647

Fishing areas

Thirty percent of the fish landed in France is caught in French waters of the European EEZ (English Channel and Atlantic Ocean) or in the Mediterranean Sea. Small-scale fishing accounts for 80 percent of this part of these landings. Semi-industrial fishing accounts for 20 percent.

Fifty percent of the fish landed is caught in other parts of the European EEZ (West Cornwall, East and West Ireland and Western Scotland). Small-scale fishing accounts for 20 percent of this part of the landings and semi-industrial and industrial fishing accounts for 80 percent.

Twenty percent of all fish landed in France are caught in international waters or within Third Countries' EEZ according to bilateral agreements by industrial fishing vessels especially by tuna-seiners.

Fisheries legislation and regulations

The Common European Fishery Policy, initiated in 1970 and updated in 1983, applies also to French fisheries. It is divided into three categories of regulations:

Fish preservation

- Total Allowable Catches (TAC) are determined annually for the main species fished (by Advisory Committee for Fisheries Management);
- technical measures are enforced: minimum sizes for fish, dimensions or sizes of fishing nets, restrictions for fishing zones, etc.

Adaptation of fishing effort to estimated resources

- Reduction of total power (KW) of operating fishing fleet;
- licensing of fishing boats;
- maintaining and modernising remaining fishing fleet.

So far, three multi-annual plans have been established to reduce fishing effort since 1983 i.e. for: 1983-86, 1987-91 and for 1992-96. As long as targets are not reached, no authorizations can be given to build new boats.

Marketing organisation

In order to regulate market alterations, the EC fixes withdrawal prices. When too many fish are landed as compared to market requirements, it is forbidden to lower prices below the fixed withdrawal price. Instead, fish must be converted into fishmeal. The EC encourages the formation of producers' organizations in the different fishing areas in order to control these operations.

Age structure of fleet (1995)

Size of vessel	Less than 5 years	5 - 10	10 - 15	15 - 20	20 - 25	More than 25	Total
< 12 m	283	933	891	807	787	1146	4 847
12 to 16 m	20	160	112	104	108	148	652
16 to 25 m	59	272	208	157	90	144	930
25 to 38 m	5	12	28	12	12	20	89
> 38 m	1	12	16	12	32	2	75
Total	368	1 389	1 255	1 092	1 029	1 460	6 593
Percentage	5.6	21.1	19.0	16.5	15.6	22.2	100

Plans for future development of fleet

Potential for development of new fishing areas

There does not seem to be any potential for the development of new fishing areas except through bilateral agreements with Third Countries. The EU provides considerable support for conclusion of fishing agreements and for the creation of joint ventures.

Potential for exploitation of new resources

The French Marine Research Institute (IFREMER) has been working for years in this field. The exploitation of deep-sea resources such as Grenadier, Orange roughy, Siki has been quite successful and progress is still being made.

Need for replacement of fishing units over next decade

As shown in the tables, the renewal rate has fallen during these past five years. Up to now no building of fishing vessels has been allowed by the European Union but a need is felt by the fishing industry to replace old boats by fewer, but more recently built ones.

Need to reduce fishing effort and size of fleet:

Control of fishing effort:

French experts do not agree on this subject. The following controls have been suggested: a global reduction; by fishing method and by species.

In 1983, the Advisory Committee for Fisheries Management asked for a global reduction of 40 percent of the fishing effort before 1996.

Finally new targets were fixed as follows:

- Fishing on overexploited stocks: 30 percent
- Fishing over MSY: 20 percent
- Fishing on fully exploited stocks: 10 percent

Reduction of fleet:

In France, the number of fishing boats was reduced by 24 percent between 1990 and 1995.

The last multi-annual plan envisaged reducing the total power of the French fishing fleet from 1 054 358 KW in 1992 to 948 591 KW in 1996. The French fisheries administration and fishery industry associations/fishermen associations, however, have not yet agreed on the figures for the Plan (1997 - 2000), which is still under discussion.

Techno-economic and operational characteristics of individual fishing units

Type of vessel	Length	KW	On board facilities/ storage	Fishing gear	Crew	Ownership	Fishing days
Handliners	8-10 m	50	Insulated fish hold	Spare hooks	1	Individual	200
Gillnetters	10-12 m	80	"	-	2	"	180
Gillnetters	12-20 m	100	Ice + insulated Fish hold	Spare nets	4-5	"	180
Coastal seiners	15 m	150	"	-	7	Individual /2-3 partners	165
Coastal trawlers	12-14 m	200	"	-	2	Individual	200
Coastal trawlers	14-16 m	250	"	-	3	Individual	210
Deep sea trawlers(fish)	15-17.5 m	300	"	1 spare trawl	4	Individual/ 2-3 partners	225
Deep sea trawlers (Norway lobster)	17-19 m	350	"	"	5	"	225
Deep sea trawlers	19-20.5 m	400	"	"	5-6	"	250
Deep sea trawlers	20.5-24 m	450	"	"	5-6	Individual/2-3 partners/ company	250
Deep sea trawlers	33-35 m	650	"	2 spare trawls		Company	268
Deep sea trawlers	50-54 m	1500	"	"		Company	262

Sharing systems

For coastal and deep sea fleets landing fresh fish, usual sharing system is as follows:

gross income less:

- Harbour dues
- Selling charges
- Fuel
- Ice
- Food
- Social insurance
- Gives income to share:
- 50 percent for boat owner(s)
- 50 percent for crew, divided into equal shares for each member.

Sometimes, especially on large vessels, skipper, engineer, etc. can get more shares or parts of the share, taken from the boat-owner's 50 percent gain.

For industrial fleets landing frozen fish, the income of the crew is composed of:

- Fixed part (minimum salary);
- proportional part, related to quantity of fish caught (major part of salary).

Economic and financial performance of individual fishing vessel (in US\$)

Type of vessel	Handliners 8-10 m	Gillnetters 10-12 m	Gillnetters 12-20 m	Coastal seiners 15 m
Total earnings	82 960	139 760	341 650	350 420
Running costs				
Fuel	2 840	4 900	15 120	8 300
Harbour dues	490	440	4 880	100
Costs of selling fish	3 250	4 220	11 410	26 660
Other running costs Including ice and food	3 000	3 290	11 560	6 230
Total running costs	9 580	12 850	42 970	41 290
Labour charges				
Labour share, wages	16 390	53 850	132 470	170 470
Social insurance	5 350	10 030	24 500	24 750
Total labour charges	21 740	63 880	156 970	195 220
Vessel costs				
Gear expenses	4 800	13 030	28 060	6 550
Repairs and maintenance	7 370	10 000	25 880	21 980
General expenses and Insurance	4 700	8 760	18 460	11 270
Total vessel costs	16 870	31 790	72 400	39 800
Total costs / expenses	48 190	108 520	272 340	276 310
Gross cash flow	34 770	31 240	69 310	74 110
Depreciation	10 730	20 910	38 900	22 730
Interest	3 090	8 360	20 910	7 820
Net cash flow	20 950	1 970	9 500	43 560

Type of vessel	Coastal trawlers 12-14 m	Coastal trawlers 14-16 m	Deep sea trawlers (fish) 15-17.5 m	Deep sea trawlers (Norway lobster) 17-19 m
Total earnings	143 850	216 510	323 170	507 370
Running costs				
Fuel	13 420	21 840	35 670	54 650
Harbour dues	1 940	1 570	2 660	29 660
Costs of selling fish	4 930	9 120	17 860	29 430
Other running costs including ice and food	3 980	6 630	19 760	33 850
Total running costs	24 270	39 160	75 950	147 590
Labour charges				
Labour share, wages	57 530	86 970	111 050	171 360
Social insurance	9 170	11 560	18 340	25 510
Total labour charges	66 700	98 530	129 390	196 870
Vessel costs				
Gear expenses	7 450	11 660	15 240	25 470
Repairs and maintenance	14 280	21 380	38 040	49 250
General expenses including insurance	7 620	14 960	20 390	21 020
Total vessel costs	29 350	48 000	73 670	95 740
Total costs / expenses	120 320	185 690	279 010	440 200
Gross cash flow	23 530	30 820	44 160	67 170
Depreciation	11 090	17 630	20 360	55 640
Interest	11 270	12 550	25 640	35 640
Net cash flow	1 170	640	-1 840	-24 110
Type of vessel	Deep sea trawler 19-20.5 m	Deep sea trawler 20.5-24 m	Deep sea trawler 33-35 m	Deep sea trawler 50-54 m
Total earnings	572 880	665 450	1 101 270	2 448 950
Running costs				
Fuel	60 980	87 680	144 360	297 090
Harbour dues	36 950	33 060	84 910	242 370
Ice			10 540	27 080

Running costs (cont'd)	Deep sea trawler 19-20.5 m	Deep sea trawler 20.5-24 m	Deep sea trawler 33-35 m	Deep sea trawler 50-54 m
Costs of selling fish	25 060	36 210	68 550	134 350
Other running costs	20 525	35 020	30 730	110 540
Total running costs	153 510	191 970	339 090	811 430
Labour charges				
Labour share, wages	208 520	208 040	322 910	769 650
Social insurance	20 700	30 880	43 640	85 640
Other labour charges			46 910	85 640
Total labour charges	229 220	238 920	413 460	942 090
Vessel costs				
Gear expenses	27 370	35 320	111 270	144 110
Repairs and maintenance	62 690	64 440	112 450	186 110
Vessel insurance			38 360	93 640
General expenses	28 060	27 130	64 910	180 760
Total vessel costs	118 120	126 890	331 990	604 620
Total costs / expenses	500 850	557 780	1 084 540	2 358 140
Gross cash flow	72 030	107 670	16 730	90 810
Depreciation	29 640	80 180	104 720 (1)	400 000 (1)
Interest	15 820	44 910	44 550	80 000 (2)
Net cash flow	26 570	-17 420	-132 540	-389 190

(1) Estimate

(2) Average amount for repayment on 10 year loan 80 percent of investment.
Interest rate eight percent.

Financial services available to fisheries sector

Access to institutional credit

Specific institutions provide credit to the fisheries sector:

- Credit Maritime finances artisanal fisheries, under French legislation this means the owner - or main partner in the ownership - is skipper of the boat.
- Credit Coopératif supervizes Credit Maritime but can also directly finance industrial fisheries which is characterized by company-owned vessels.

A few years ago, the liberalization of the banking sector allowed some commercial banks to finance the fishery sector (1993-1994). Recently, however, these banks have ceased lending to this sector.

Terms of finance

- Banks can make loans up to 80 percent of building value or modernization costs after taking into account potential subsidies;
- repayment period: 10-15 years after two years deferral for capital repayment;
- subsidized interest rates to arrive at final rate between six and eight percent according to the investment (new building or modernization for instance);
- banks take mortgages on vessels and ask for collateral and other securities.

Financial subsidies

In so far as multi-annual plans for reducing European fishing fleets have reached their targets, subsidies are allowed for building new boats or renewing old ones, while staying within national capacities prescribed. The following rates apply:

	Region objective 1 (1)	Other regions (2)
Rate of European subsidies	< 50 %	< 30 %
National subsidies (French state, regions, etc.)	> 5 %	> 5 %
Participation of beneficiary	> 40 %	> 60 %

(1) Corse

(2) Nord-Picardie, Haute et Basse Normandie, Bretagne, Pays de la Loire, Poitou-Charentes, Aquitaine, Languedoc-Roussillon, Provence-Alpes-Côte d'Azur.

The subsidy budget for 1994-1999 is the equivalent of 45 million US\$.

Tax exemptions on fuel and fresh fish:

- On fuel: normal price US\$0.82 / litre; reduced price for fishing US\$0.20 / litre;
- on fish: no tax on value added (TVA) for fresh fish (frozen fish 5.5 %).

3.2 Germany

Techno-economic and operational characteristics of fishing fleets

Four main types of fishing vessels are regularly surveyed:

- *Freezer trawlers* and *fresh fish trawlers* (offshore fleet)
- *Shrimp trawlers* and *fresh fish trawlers* (inshore cutter fleet)

Techno-economic characteristics leads to following conclusions:



Side trawler, Germany

- Offshore fleet: the distant water freezer trawler fleet is reduced as fishing possibilities in waters of third countries lessen. The distant fresh fish trawler fleet is being reduced also;
- fresh fish cutters aim at demersal species such as cod, sole and plaice. Roundfish cutters suffer losses as cod stocks are low, while flatfish cutters have better results;
- shrimp cutters, using shrimp beam trawls, are highly specialized. They are dependent on stock availability and price levels, which can vary for this species (*Crangon* spp). In 1996, the economic performance of this type of boat was good.

Financial and economic performance (in US\$)

The information on economic and financial performance, which is indicated below, is based on different sample sizes:

Freezer trawlers: data given are the average for the whole fleet of 11 vessels.

Cutter fleet: for boats fishing shrimps and fresh fish in the North and Baltic sea, the section covered includes fresh fish vessels of 16 m and more, accounting for 70-80 percent of landings' quantity and value.

For boats fishing fresh fish exclusively in the Baltic Sea (Sassnitz). The sample studied represents 12 out of 25 vessels.

Type of vessel	Freezer trawler	Cutter fishery		
		North Sea shrimps	North and Baltic Sea fish	Baltic Sea fish
Total earnings	2 123 120	172 000	371 210	348 580
Running costs				
Fuel	161 700	12 830	37 870	32 130
Harbour dues	158 860	790	3 610	
Ice / salt		450	7 870	3 800
Costs of selling fish	60 620		38 460	62 960
Other running costs	137 100	640	1 590	
Total running costs	518 280	14 710	89 400	98 890
Total labour charges	875 680	43 560	107 000	83 570
Vessel costs				
Gear expenses	107 270			
Repairs and maintenance	228 920	14 170	43 010	23 360
Vessel insurance	39 320	5 500	10 320	9 310
General expenses	166 480	28 340	31 140	17 870
Total vessel costs	541 990	48 010	84 470	50 540
Total costs / expenses	1 935 950	106 280	280 870	233 000
Gross cash flow	187 170	65 720	90 340	115 580
Depreciation	140 970	12 150	24 620	22 200 (1)
Interest	10 230	8 090	12 920	12 480
Net cash flow	35 970	45 480	52 800	80 900

(1) Estimate



Longliner, Spain

3.3 Spain

Fishing fleet

Type of vessel	Number	GRT	KW
Trawlers			
Bottom trawl	2 437	322 335	879 764
Midwater trawl	7	3 924	7 559
Pelagic trawl	6	313	1 319
Not specified	1	79	367
Seiners			
With ring-nets	1 084	46 827	205 178
Tuna purse seiner	88	57 537	131 062
Not specified	9	366	1 283
Drag netters	747	1 917	13 937
Dipping-netters	2	10	128
Gillnetters			
Set nets	275	3 594	18 230
Not specified	5 491	18 216	117 405
Boats using traps/pots	1 250	2 624	16 191
Handliners	1 914	3 652	16 153
Longliners			
Bottom lines	1 203	44 831	149 014
Drifting lines	249	20 636	60 119
Tuna longlines	34	2 934	9 464
Not specified	35	501	2 396
Pole and liners	824	4 246	19 903
Tow liners	46	2 238	7 422
Multipurpose	3 065	10 409	62 863
TOTAL	18 767	547 194	1 719 757

Fishing areas

Type of vessel	Size (m)	Type of species targeted	Fishing area	Distance from harbour (nautical miles)
Coastal trawler	14	Demersal	N-W coast	80
	18		E coast (Mediterranean)	50
Deep sea trawler	23		N-W coast	80
	30		N-E Atlantic	650
Freezer trawler	56		N-W Atlantic	2500
	57		S-E Atlantic	4500
	80		S-W Atlantic	6000
Coastal seiner	17	Pelagic	W- coast	700
	24	-	E- coast (Mediterranean)	50
Tuna seiner	56	Tuna	International waters: Atlantic and Indian Ocean	
	64			
	70			
Longliner	20	Demersal	N-W coast	100
	29		W- coast	200
Pole and liner	24	Tuna	N-W coast	500

Fisheries legislation and regulations

Spain joined the EEZ in 1978 and the Common European Fisheries Policy has been applied to the fisheries sector since 1985 along the same lines as described above for France.

More specifically, the following management policies and measures are being followed in Spain:

- Resource preservation;
- total allowable catch;
- minimum sizes for fish
- fish reserves (fishing prohibited)
- technical restrictions (zones, mesh-sizes and GRT)
- adjustment of fishing effort.

Subsidies and special financial support are available in Spain for exploratory fishing, closing of fishing seasons, joint-ventures, fishing agreements with third countries and withdrawal of fishing boats.

Age structure of fishing fleet (%)

Type of vessel	Age of vessel (years)			
	Less than 10	10 - 20	20 - 30	More than 30
Trawlers:				
Bottom trawler	26	16	42	16
Midwater trawler	77	0	11	13
Pelagic trawler	-	6	-	94
Not specified	100	-	-	-
Seiners:				
Bluefish seiners	13	25	37	26
Tuna purse seiners	26	41	29	3
Not specified	78	-	9	13
Drag netters	19	18	22	41
Dipping netters	-	12	-	88
Gillnetters:				
Set nets	29	14	26	31
Not specified	17	22	30	30
Boats using traps and pots	29	20	25	27
Handliners	9	20	27	44
Longliners				
Bottom lines	18	15	50	17
Drifting lines	40	11	28	22
Tuna lines	24	14	11	21
Not specified	38	17	33	11
Poles and liners	6	17	43	34
Tow liners	16	6	49	29
Multipurpose	11	26	26	37
Whole fleet	17.5 %	23 %	40.4 %	19.1 %

Plans for future development of fleet

Potential for development of new fishing areas:

New fishing areas have been found and are being sought through:

- Participation in EU agreements with Third Countries;
- agreements with northern countries such as Canada;
- agreements with South American countries such as Argentina;
- agreements with North African countries such as Morocco;
- other countries from Africa and the Indian Ocean such as Angola, Cape Verde, Comoros, Ivory Coast, Gambia, Guinea Bissau, Guinea Conakry, Equatorial Guinea, Senegal, Seychelles.

Potential for development of new resources:

The following activities are undertaken:

- Evaluation of the fisheries resources in mid-eastern Atlantic Ocean; most of the agreements signed between the EU and third countries include programmes of evaluation of their fisheries resources in participation with the Spanish Fisheries Research Institute;
- identification and evaluation of fisheries resources in remote areas of the northwest Atlantic, northeast Atlantic, southwest Atlantic and Angola (deep waters), southeast Atlantic, southwest Indian Ocean, Antarctic waters;
- experimental fishing campaigns.

Need for replacement of fishing units to maintain size of fleet or expend it:

European fishing fleets are generally considered as having an overcapacity.

European regulations address this problem by selective incentives for building or renewing certain types of vessels and for "exporting" other types of vessels through joint ventures.

The Spanish fishing fleet is quite old:

- 63.6 percent of the fleet is more than 20 years old;
- 35.5 percent of the fleet is more than 30 years old.

The national target is to build 103 200 GRT from 1994 to 1999 in order to complete renewal of the fleet within 30 years. But this will be possible only if the European target for withdrawal of overcapacities is reached.

Need for reducing fishing effort and size of fleet:

This need arises because of regulation of fishing effort through European TAC and national quotas.

Quotas for Spain in 1994:

Species	Quota
Anchovy	32 740
Mackerel	30 160
Horse mackerel	70 270
Pollack	1 640
Cod	11 500
Hake	24 220
Whiting	2 000
Blue whiting	74 000
Sole	770
Megrim	12 780
Monkfish	12 650
Norway lobster	3 220

Regulation of fishing effort is done through enforcement of technical measures such as:

Prohibited or restricted fishing zones/periods;
restrictions on certain types of vessels or gears;
minimum sizes for fish.

Adjustment of fishing effort is made through:

Withdrawal of fishing vessels through destruction or exportation (vessels > 25 GRT) to countries applying international conventions related to the protection of fisheries resources. The multi-annual plans 1992-1996 and 1997-1999 set the following targets for Spain:

Withdrawal of up to 900 vessels; GRT: 119 000; KW: 238 000.

Encouragement to create new joint-ventures: permanent: 59; temporary: 36 for the period 1994-1999.

Techno-economic and operational characteristics of individual fishing units

Type of vessel	Length (m)	KW	On board facilities/ processing and storage	Fishing gear	Crew	Ownership	Fishing days
Coastal trawler	14	169	Ice + insulated hold	2 trawls	2	Individual	200
"	18	331	"	"	7	"	225
Deep sea trawler	23	320	"	"	12	"	223
"	30	736	"	"	15	2-3 partners or company	205
Freezer trawler	56	1472	Sorting, processing and freezing	3 trawls	28	Company	115
"	57	1619	+ freezer storage	"	28	"	192
"	80	2208	"	4 trawls	47	"	220
Coastal seiner	17	265	Insulated hold	2 seines	14	Individual	85
"	24	442	"	"	12	"	165
Tuna seiner	56	2208	Freezing in brine + freezer storage	1 seine	20	Company	274
"	64	2944	"	"	25	"	290
"	70	2944	"	"	20	"	315
Longliner (bottom lines)	20	271	Ice + insulated hold	1 long-line	18	Individual	160
"	29	515	"	"	15	Individual or 2-3 partners or company	208
Pole and liner	24	300	"	Spare hooks and lines	14	Individual or 2-3 partners	

Sharing systems

For coastal and deep sea fleets landing fresh fish, usual sharing system is as follows:

Gross income less:

- Harbour fees
- Selling charges
- Fuel
- Ice
- Maintenance of gears
- Social Insurance

Income to share:

50 percent for boat owner(s)

50 percent for crew, divided into equal shares for each member.

Sometimes skipper, engineer, etc., can receive one or more shares but these additional shares are taken from the boat-owner's 50 percent gain.

For industrial fleets landing frozen fish, salary is composed of: fixed part (minimum salary); proportional part related to quantity of fish caught (major part of salary).

Economic and financial performance of individual fishing vessels (in US\$)

Type of vessel	Coastal trawler	Coastal trawler	Deep sea trawler	Deep sea trawler
	14 m	18 m	23 m	30 m
Total earnings	159 460	226 100	603 330	809 200
Running costs				
Fuel	14 280	28 560	69 020	152 320
Lubricant		2 380	2 380	10 710
Harbour dues	8 330	9 520	9 520	20 230
Icc / salt		3 570		11 900
Food	1 190	4 760	30 940	20 230
Costs of selling fish			13 090	38 080
Total running costs	23 800	48 790	124 950	253 470
Labour charges				
Labour share, wages	66 640	90 440	221 340	262 990
Social insurance	17 850	16 660	55 930	65 450
Total labour charges	84 490	107 100	277 270	328 440
Vessel costs				
Gear expenses	7 140	3 570	20 230	44 030
Repairs and Maintenance	10 710	10 710	34 510	66 640
Vessel insurance	3 570	3 570	17 850	17 850
General expenses	3 570	1 190	7 140	16 660
Total vessel costs	24 990	19 040	79 730	145 180
Total costs / expenses	133 280	174 930	481 950	727 090
Gross cash flow	26 180	51 170	121 380	82 110
Depreciation	12 300 (1)	16 660	41 650	71 400
Interest (2)	4 800	6 900	27 700	27 700
Net cash flow	9 080	27 610	52 030	-16 990

(1) Estimate

(2) Average amount for repayment on 13 year loan 80 percent of investment.
Interest rate 9 percent.

Type of vessel	Coastal seiner 17 m	Coastal seiner 24 m	Longliner 20 m	Longliner 29 m	Pole and liner 24 m
Total Earnings	232 050	298 690	872 270	824 670	393 890
Running costs					
Fuel	10 710	1 7850	5 1170	97 580	
Lubricant	2 380	2 380			
Harbour dues	9 520	22 610	1 7850	16 660	
Ice	1 190	5 950	10 710	7 140	
Food	8 330	13 090	27 370	39 270	
Costs of selling fish		26 180		23 800	
Other running costs				110 670	
Total running costs	32 130	88 060	107 100	295 120	62 070
Labour charges					
Labour share, wages	98 770	72 590	384 370	205 870	184 450
Social insurance	44 030	36 890	134 470	73 780	38 080
Other labour charges					
Total labour charges	142 800	109 480	518 840	279 650	222 530
Vessel costs					
Gear expenses	2 380	2 380	24 990	44 030	
Repairs and maintenance	5 950	3 570	34 510	59 500	
Vessel insurance	2 380		16 660	14 280	
General expenses	2 380	2 380	36 890	3 570	
Total vessel costs	13 090	8 330	113 050	121 380	36 700
Total costs / expenses	188 020	205 870	738 990	696 150	321 300
Gross cash flow	44 030	92 820	133 280	128 520	72 590
Depreciation	23 800	30 500 (1)	43 100 (1)	71 400	24 800 (1)
Interest (2)	4 600	6 900	17 600	27 700	6 100
Net cash flow	15 630	55 420	72 580	29 420	41 690

(1) Estimate

(2) Average amount for repayment on 13 year loan 80 percent of investment. Interest rate nine percent

Type of vessel	Freezer trawler 56 m	Freezer trawler 57 m	Freezer trawler 80 m	Tuna seiner 56 m	Tuna seiner 64 m	Tuna seiner 70 m
Total Earnings	2 283 610	3 564 050	2 365 720	4 262 580	6 259 400	5 321 680
Running costs						
Fuel	176 120	295 120	489 090	477 190	596 190	515 270
Lubricant	10 710	20 230	17 850	33 320	59 500	52 360
Harbour dues		28 560	165 410			32 130
Salt				66 640	71 400	60 690
Food	28 560	48 790	96 390	105 910	117 810	154 700
Costs of selling fish	183 260	379 610		1 150 730	1 686 230	1 493 450
Other running costs		53 550		15 470	13 090	20 230
Total running costs	398 650	825 860	768 740	1 849 260	2 544 220	2 328 830
Labour charges						
Labour share, wages	593 810	653 310	534 310	721 140	971 040	1 031 730
Social insurance	128 520	229 670	133 280	180 880	182 070	257 040
Other labour charges		28 560	9 500	148 750	227 290	91 630
Total labour charges	722 330	911 540	677 110	1 050 770	1 380 400	1 380 400
Vessel costs						
Gear expenses		49 980	115 430	130 900	117 810	
Repairs and maintenance	101 150	254 660	229 670	358 190	714 000	636 650
Vessel insurance	73 780	123 760	65 450	94 010	123 760	73 780
General expenses	298 690	320 110	55 930	568 820	775 880	411 740
Total vessel costs	473 620	748 510	466 480	1 151 920	1 731 450	1 122 170
Total costs / expenses	1 594 600	2 485 910	1 912 330	4 051 950	5 656 070	4 831 400
Gross cash flow	689 010	1 078 140	453 390	210 630	603 330	490 280
Depreciation	(1) 223 450	233 240	(1) 350 000	(1) 380 000	416 500	(1) 500 000
Interest (2)	197 700	205 500	283 000	182 200	193 850	205 000
Net cash flow	267 860	639 400	-179 610	-351 570	-7 020	-214 720

(1) Estimate

(2) Average amount for repayment on 13 year loan 80 percent of investment. Interest rate nine percent.

Financial services available to fisheries sector

Access to institutional credit: no specific institutions.

Terms of finance

- Banks can make loans up to 80 percent of building or modernization costs after taking into account subsidies;
- repayment period is 12 to 14 years after two years deferral for capital repayment;
- possible subsidy on interest rate up to three percent at the condition final rate > 8 percent;
- bank takes a mortgage on the vessel concerned, but considering it covers only 50 percent of the value in case of resale, that is 62 percent of the loan, the bank requires collateral security for 37.5 percent of the loan.

Financial subsidies

When multi-annual plans for reducing European fishing fleets have reached their targets, subsidies can be allowed for building new boats or renewing old ones, while staying within national capacities prescribed.

	Regions Objective 1 (1)	Other Regions (2)
Rate of European subsidies	< 50 %	< 30 %
National subsidies (Spanish State, Regions etc.)	> 5 %	< 5 %
Participation of Beneficiary	< 40 %	> 60 %
(1) Andalucía, Asturias, Cantabria, Galicia, Canarias, Murcia, Ceuta y Melilla		
(2) Cataluña, Baleares and País Vasco		

Budget for 1994 - 1999: Spain = US\$398 million

Tax exemptions

- On fuel: rmal price US\$ = 0.59 / litre
reduced price for fishing = 0.19 / litre
- On Fish: no tax on value added (IVA) for fresh fish (frozen fish = 7 %)

4. Latin America

4.1 Argentina

Fishing fleet

	Deep sea fleet			Inshore fleet		Total
	Ice trawlers	Freezing vessels	Factory vessels	Coastal vessels	Artisanal boats	
Average hold (m ³)	286	693	1 181	80	15	-
Number	196	360	36	200	373	1 165

Fishing areas by main species

Argentine hake:	All year latitude 34° to 46°S; different locations and depth
Southern blue whiting:	Winter, spring: latitude 37°7 to 54°S Summer: latitude 42° to 54°S Principal area: continental slope and Malvinas islands
White Croaker:	All year Buenos Aires coast up to San Matias Gulf
Argentine anchovy:	Spring: off Mar del Plata shore Summer: latitude 38°30 to 40°S Autumn: latitude 38° to 40°S, continental slope
King clip:	Winter: latitude 41° to 48°S Summer: latitude 43°5 to 48°S, continental shelf and slope
Patagonian grenadier:	Winter: latitude 50° to 50°5S and 53° to 54°S Summer: latitude 50°5 to 54°5S and NW Malvinas, continental slope.
Patagonian tooth fish	Winter: large concentrations latitude 37°5 to 39°5S continental slope and south of Malvinas latitude 52°5 to 54°5 S Summer: scattered
Sea trout:	All year Buenos Aires coastline
Mackerel:	December to April beginning of concentration near Mar del Plata Catches latitude 23° to 43°S
Grouper:	All year Along coastline; major concentrations: N. San Jorge Gulf and Valdes peninsula.
Flounder:	All year; all along continental slope
Flat head:	All year; temperate waters, all along the coast
Argentine squid:	Summer concentrations off Puerto Deseado and Golfo Nuevo Autumn: latitude 38° to 47°S
Shrimp-prawn:	June to March Patagonian littoral and Buenos Aires coast Standing out San Jorge Gulf and Camarones Bay



Purse seiner, Argentina

Fisheries legislation and regulations

By law existing fishing resources are considered to be under Argentine sovereignty, up to 200 n mi. In principle, this zone can only be exploited by vessels with Argentine flags and holding a licence previously granted by the competent authority.

Since 1992, a decree allows the chartering of foreign flag vessels for periods of three years. Argentina and the European Union have signed a fishing agreement for an annual catch up to 250 000 tons during an initial five-year period.

Since 1970, the sovereignty of the provinces is recognized up to three n mi from shore. The Secretaria de Agricultura, Ganaderia y Pesca, rules and enforces the regulations, decrees and laws related to fisheries especially: fees for each category of fishing boat; bans and restrictions for fishing and gears; safety of fish as food.

Fishing permits range from US\$500 to 10 000 per boat, for a maximum period of three years.

In December 1996 new fishing permits were suspended for one year

Age structure of fleet

Age in years	Deep sea fleet			Inshore vessels		Total
	Ice trawlers	Freezer vessels	Factory vessels	Coastal vessels	Artisanal boats	
< 35	46	4	-	39	232	321
25 to 35	51	41	8	33	31	164
15 to 25	32	117	20	32	22	223
5 to 15	43	174	8	41	18	284
< 5	24	24	-	47	16	111
Not specified	-	-	-	8	54	62
Total	196	360	36	200	373	1 165

Techno-economic and operational characteristics of individual fishing units

Type of vessel	Length (m)	KW	On board facilities / storage	Fishing gear	Crew size (1)	Fishing days
Ice trawlers						
25 m	25	515	Ice + fishhold 64 tons	Bottom trawl	10	
30 m	30	661	" 100 tons	"	13	
35 m	35	956	" 170 tons	"	18	234

(1) Estimate

Financial and economic characteristics of individual fishing units

Investment costs (in US\$)

Investments in US\$	Hull, engine and propulsion, fishing gear
Type of vessel	
Ice trawler 25 m	780 000
" 30 m	1 200 000
" 35 m	2 000 000

Economic and financial performance (in US\$)

Type of vessel	Trawler 25 m	Trawler 30 m	Trawler 35 m
Total earnings	855 000	1 050 000	1 940 000
Running costs			
Fuel	121 900	134 160	234 050
Harbour dues	64 540	71 030	123 910
Ice	78 880	86 810	151 440
Total running costs	265 320	292 000	509 400
Labour charges			
Labour shares, wages	172 460	189 790	331 110
Social insurance	92 860	102 200	178 290
Other labour charges			
Total labour charges	265 320	291 990	509 400
Vessel costs			
gear expenses			
Repairs and maintenance	71 710	78 920	137 680
vessel insurance	7 170	7 890	13 770
General expenses	57 370	63 130	110 140
Total vessel costs	136 250	149 940	261 590
Total costs / expenses	666 890	733 930	1 280 390
Gross cash flow	188 110	316 070	659 610
Depreciation	50 200	55 240	96 370
Interest	(1) 31 600	(1) 48 600	(1) 81 000
Net cash flow	106 310	212 230	482 240

(1) Average amount for repayment on eight year loan 80 percent of investment.
Interest rate nine percent.

Financial services available to fisheries sector

The general conditions for financing enterprises can be applied to the fisheries sector as follows.

Terms of finance:

- Loan is provided for 70 to 90 percent of the total investment;
- loans are provided for capital assets and / or working capital;
- all sizes of enterprises have access to credit;
- repayment period: 2-8.5 years;
- interest rate = 6.5 to 12 percent

There are no special subsidies for the fisheries sector.



Purse seiners, Peru

4.2 Peru

Fishing fleet

No.	Category of fishing vessels	Type of fishing	Species
	Industrial and semi-industrial		
620	Fishing for fish meal industry (fishhold with refrigeration and ice)	Purse seine	Anchovy Sardine
110	Fishing for canning industry or direct consumption (RSW, CSW or ice)	Purse seine	Sardine Chubmackerel Scad
70	Fishing for direct consumption (fishhold with preservation) - ice 90 % - freezing 10 %	Trawl	Hake
	Artisanal fishing		
6 250	Essentially wooden boats - 65 % motorised - 35 % non motorised Fishhold capacities 25 % < 1 m tonne 26 % 1 to 2 m tonne 28 % 2 to 5 " 11 % 5 to 10 " 10 % 10 to 30 "	40 % gillnets 20 % handliners 4 % longlines	

Fisheries legislation and regulations

- Industrial and semi-industrial vessels operate beyond the 5 n mi limit from shore up to 40-70 n mi;
- artisanal boats can fish within the 5 n mi limit; most of them extend operations up to 30 n mi and even 80 n mi (longliners).

A General Fishery Law was passed in 1992 and later on an Environmental Code.

Main regulations

Minimum sizes for fish and for net-meshes:

Anchovy: minimum size		2 cm	minimum mesh-size	13 mm
Sardine	26	38		
Chub-Mackerel	32	38		
Sead	34	38		
Hake	35	110		

For purse seiners and trawlers: strict replacement of old vessels, which equal capacity fishing units (volume of fishhold); no increase of fishing effort is permitted.

For hake: vessels longer than 70 m and larger than 1 400 m³ are banned; fishing areas need to be beyond 5 n mi and further than 10 n mi when processing on board; purse seiners are prohibited.

Age structure of fleet

Years	Purse seiners fishing for fishmeal	Purse seiners fishing for canneries	Trawlers fishing hake
> 33	10	-	6
28 - 32	210	15	24
23 - 27	200	13	1
18 - 22	20	-	12
13 - 17	-	11	6
8 - 12	10	-	3
3 - 7	70	11	13
< 3	100	60	5
Total	620	110	70

Techno-economic and operational characteristics of individual fishing units

Types of vessel	Length (m)	KW	On board facilities / storage	Fishing gear	Crew size	Ownership	Fishing days
Purse seiners							
Fishhold of							
35 m ³	14.1	147	Fishhold 35 m ³	Seine 290 x 37m	6	Company	200
120 m ³	21.5	257	120 m ³	450 x 70m	10	"	"
180 m ³	25.4	279	180 m ³	500 x 80m	11	"	"
270 m ³	31.1	419	270m ³	615 x 85m	13	"	"
350 m ³	36.4	632	Ice + fishhold 350 m ³	800 x 115m	14	"	"
Trawlers							
80 m ³	19.7	305	Ice + Fishhold 80 m ³	trawl	10	"	220
140 m ³	28.8	636	140 m ³	"	11	"	"
220 m ³	33.1	672	220 m ³	"	15	"	"

Financial and economic characteristics of individual fishing units

Investment costs (in US\$)

Investments	Hull	Fishhold	Deck equipment	Engine and propulsion	Fishing gear	Total value
Depreciation rate	4 %	4 %	10 %	10 %	20 %	
Type of vessel						
Purse seiner						
35 m ³						
120 m ³	554 000		73 000	83 000	110 000	820 000
180 m ³						
270 m ³	1 007 000		175 000	313 000	250 000	1 745 000
350 m ³	1 307 000	130 000	260 000	383 000	280 000	2 360 000

Economic and Financial Performance (in US\$)

Type of vessel	Purse seiner 35 m ³	Purse seiner 120 m ³	Purse seiner 180 m ³	Purse seiner 270 m ³	Purse seiner 350 m ³
Total earnings	200 000	480 000	600 000	1 080 000	1 650 000
Running costs					
Fuel	25 000	80 000	110 000	150 000	220 000
Lubricant	3 000	8 000	11 000	15 000	22 000
Harbour dues	2 000	4 000	4 000	5 000	6 000
Other running costs	1 000	2 000	2 000	3 000	3 000
Total running costs	31 000	94 000	127 000	173 000	251 000
Labour charges					
Labour share, wages	35 000	75 000	150 000	210 000	222 000
Social insurance	16 000	39 000	72 000	100 000	108 000
Total labour charges	51 000	114 000	222 000	310 000	330 000
Vessel costs					
Gear expenses	2 000	3 000	4 000	4 000	5 000
Repairs and maintenance	12 000	38 000	65 000	85 000	100 000
Vessel insurance	10 000	16 000	18 000	23 000	30 000
General expenses	12 000	29 000	32 000	37 000	45 000
Total vessel costs	36 000	86 000	119 000	149 000	180 000
Total costs / expenses	118 000	294 000	468 000	632 000	761 000
Gross cash flow	82 000	186 000	132 000	448 000	889 000
Depreciation	(1)30 000	59 760	(1)85 000	139 080	177 780
Interest (2)	20 500	33 600	49 200	71 500	96 800
Net cash flow	31 500	92 640	2 200	237 420	614 420

(1) Estimate

(2) Average amount for repayment on seven year loan 80 percent of investment. Interest rate nine percent.

Type of vessel	Trawler 80 m ³	Trawler 140 m ³	Trawler 220 m ³
Total earnings	697 500	842 810	962 940
Running costs			
Fuel	77 000	132 000	308 000
Lubricant	5 000	8 000	17 400
Ice	83 600	92 400	154 000
Other running costs	1 000	1 100	1 100
Total running costs	166 600	233 500	480 000
Labour charges			
Labour share, wages	94 800	105 600	176 000
Total labour charges	94 800	105 600	176 000
Vessel costs			
Gear expenses	10 000	13 000	15 000
Repairs and maintenance	20 000	25 000	35 000
Vessel insurance	2 600	3 000	3 500
General expenses	8 000	9 900	11 000
Total vessel costs	40 600	50 900	64 500
Total costs / expenses	302 000	390 000	721 000
Gross cash flow	395 500	452 810	241 940
Depreciation (1)	50 000	65 000	100 000
Interest (2)	25 400	47 100	67 600
Net cash flow	-320 100	-340 710	-74 340

- (1) Estimate
- (2) Average amount for repayment on seven year loan 80 percent of investment.
Interest rate nine percent.

Financial Services available to fisheries sector

A number of specialized credit/investment programmes are available for the fisheries sector.

Purse-seiners and trawlers:

No discrimination is made between local and foreign investors. The new financial norms include the financing of joint ventures on the following terms:

Programmes	Terms of payment years	Amount of loan US\$	Financing level
PROPEM	2 / grace 7 / repayment	2 000 to 140 000	70 % of investment
MULTISECTORIAL	2 / grace 7 / repayment	50 000 to 5 000 000	60 % of investment
FIMEX	1 year	100 000 to 1 000 000	90 % of investment
EXPORT-FLAR	6 months	50 000 to 1 000 000	100 % of financing
CAF	"	10 000 to 1 000 000	100 % of financing
FLAR	"	100 000 to 2 000 000	90 % of investment

Any commercial bank or financial institution can provide credit for fishery enterprises, based on the above conditions. Rates are discussed for each project separately and there are no capital subsidies and tax exemptions.

Artisanal fishing sector:

This sector is catered for by the *National fund* for the development of artisanal fishing sector: FONDEPES.

Terms of Finance:

Amount of credit:

Volume of fishhold (metric tonnes)	Building Material	Region	Amount of Credit US\$
<2	Wood	N and S	8 000
3	"	N and S	10 000
3	Fibreglass	S	29 000
3	"	N	20 000
4	Wood	S	13 000
4	"	N	30 000
4	Fibreglass	N and S	35 000
6	Wood	S	16 000
6	"	N	38 000
6	Fibreglass	N and S	52 000

Requirements:

Mortgage up to 10 percent of loan (wooden boats)

Mortgage up to 4 percent of loan (fibreglass boats)

Terms of payment :

Amount	Repayment - months	Grace period - months
Up to US\$6 500	30	1
US\$6 501 to 20 000	42	1
More than US\$20 000	48	1

Interest rate : No interest

APPENDIX II

Coverage of study

(Reference is made to marine capture fisheries production in 1995, in metric tonnes)

A. <u>Regions where studies were carried out:</u>		
		Tonnes
Latin America	Total catch	19 311 231
	Peru	8 886 684
	Argentina	1 135 474
	Sub-total	10 022 158
	% of total	51.90 %
Africa	Total catch	3 553 948
	Ghana	293 910
	Senegal	318 228
	Sub-total	612 138
	% of total	17.22 %
Asia	Total catch	36 491 203
	China	10 268 400
	Rep. of Korea	2 310 282
	Indonesia	3 157 400
	India	2 602 677
	Thailand	2 858 124
	Malaysia	1 106 486
	Sub-total	22 303 369
	% of total	61.12 %
Europe	Total catch	11 866 137
	Spain	1 172 740
	France	508 228
	Germany	216 864
	Sub-total	1 897 832
	% of total	16 %
B. Total marine capture fisheries production by regions not covered by the study:		
North America		7 679 601
Oceania		895 842
Former USSR		4 821 839
C. Grand total A & B:		84 747 463
D. Total marine capture fisheries production of countries where case studies were carried out:		
		34 835 497
E. % of D of C:		41.1 %



Participants of the Interregional Workshop on Economic Viability and Sustainability of Marine Capture Fisheries



Purse seiner, Thailand

APPENDIX III

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APPENDIX IV

Workshop recommendations

Working Group I: Enhancing economic performance

Terms of reference

1. Based on the case studies and workshop discussions, what can be concluded regarding financial viability of marine capture fisheries with reference to different continents and different fisheries? Does it cover cost of operations (positive cross cash flow)? Does it allow for re-investment (positive net cash flow)?
2. What are the differences between small-scale/inshore and large-scale offshore operations regarding costs and returns?
3. Are there any differences in profitability and economic returns between sustainable and non-sustainable fishing practices (non-sustainable=exploiting heavily or over-exploited resources)? What are these differences?
4. With reference to different countries and continents, and in comparison with agriculture and food processing, is capture fisheries presently subsidized through availability of subsidized institutional credit, tax and duty rebates on production inputs such as fuel, spare parts, etc?
5. Measures and policies for promoting economically viable and sustainable fishing practices and role of fisher and fishing industry associations, the private sector, national governments and FAO.

Summary of discussions and recommendations

1. Economical and financial viability of marine capture fisheries

The working group noted that the case studies, surveys and information presented and discussed in the workshop covered Peru and Argentina (South America); Senegal and Ghana (Africa); China, Korea, Taiwan, Indonesia, Malaysia, Thailand, India (Asia) and France, Germany and Spain (Europe). These countries accounted for about 49 percent of the total marine catch of their respective regions, which again accounted for 84 percent of the global catch in 1995.

It was also noted that the fishing fleets and units covered by the studies included all major types of medium- and large-scale fishing vessels operating in the countries while small-scale/artisanal fishing boats were only covered in the African countries Ghana and Senegal, in France and in Indonesia, Malaysia and, in a limited way, in India.

Regarding the economic viability of marine capture fisheries, the working group observed that - in spite of heavily and sometimes over-exploited fisheries resources - in most cases, marine capture fisheries is still an economically and financially viable undertaking which generates sufficient revenue to cover the cost of depreciation as well as the opportunity

cost of capital and generates funds for reinvestment in addition to employment, income and foreign exchange earnings.

While appreciating the efforts made by the various institutions and organizations which had been involved in the study, and by FAO in initiating and coordinating and summarizing the findings and organizing the workshop, the working group also noted the limited scope and duration of the study. It strongly recommended that the study should be continued and expanded, and that the findings need to be confirmed and validated by future monitoring of the economic performance of fishing fleets. Special attention needs to be paid to include all costs of fishing including realistic rates of depreciation.

The working group also suggested that micro- or in-depth studies on the interaction between different fishing practices should be carried out before arriving at policy decisions. It was further recommended that future monitoring and studies should generate more information on the level of exploitation of fisheries resources being exploited by the fishing fleets under study.

2. Differences in economic viability between small-scale inshore and large-scale offshore operations

The working group noted the general lack of information on the economics of small-scale fisheries in Asia and South America. The need for clarity of definition of small-scale inshore and large-scale offshore fisheries was highlighted.

Regarding West Africa, no significant difference in economic performance between the two sectors was observed. The small-scale sector performed generally well except for encircling gillnetters in Senegal. The case of Senegal demonstrated the negative impact of industrial fishing vessels that competed with the small-scale inshore sector for space and resources. It was strongly recommended that efforts should be strengthened through introduction of zoning, etc., to prevent industrial fishing vessels from fishing in inshore waters since their fishing activities may adversely affect the economic performance of inshore vessels. In the case of Ghana it was noted that both the small-scale and the industrial sector showed a better economic performance than the semi-industrial sector.

For Asia it was observed that the economic performance seems to be negatively influenced and hampered in Indonesia and India by medium-scale and large-scale inshore and offshore purse seining and trawling operations. It was also noted that there was no information from China, Taiwan, Korea and Thailand and only limited information from Indonesia and India.

For Europe it was noted that in France and Germany, the small-scale fisheries sectors seem to perform reasonably well while the study from Spain did not include any small-scale fishing units.

The working group strongly recommended that in future the study should explicitly include small-scale fishing fleets and also look at the creation of employment by the various types of fishing fleets and their contribution to food security and to meeting the nutritional needs of local populations.

3. Profitability of sustainable and non-sustainable fishing practices

The working group generally observed that many countries had not provided reliable information on the status of fisheries resources vis-à-vis fishing practices. With reference to those countries which had provided the required information, the working group observed that if non-sustainable is defined as a destructive method, or one which exploits already over-exploited resources, some forms of large-scale trawling, tuna seining and bottom pair trawling in Senegal, Peru, China and France and Spain stand out as having negative economic and financial results.

It was also observed that even in the artisanal and small-scale sector there were unsustainable fishing practices if an unsustainable fishing practice was defined as one that exploited already over-exploited resources.

4. Role of subsidies

The working group observed that when compared to agriculture the fisheries sector has always enjoyed fewer subsidies. Moreover, it was observed that the number of subsidies in developing and developed countries has recently been greatly reduced. In developing countries subsidies are presently available, in some cases, for offshore fishing, artisanal fisheries and fisheries cooperatives and for fishing operations in remote and underdeveloped areas. These subsidies are mainly in the form of capital subsidies and reduced duty on fuel but even these are in the process of being further reduced.

The working group observed that in comparison with developing countries, more subsidies for the fisheries sector are available in the EC, e.g. capital subsidies, reduced tax on fuel, compensation for non-fishing days, minimum prices for catch, etc.

It was also observed that European fishing vessels received subsidies for fishing outside EC waters. This was seen as having a negative impact on the economic performance of fishing vessels of developing countries in whose waters the European vessels fished and which did not receive any subsidy.

The working group recommended subsidies should be given to fishing vessels, which undertake sustainable fishing practices. Selective subsidies should be given for multi-purpose vessels, which engage in sustainable fishing practices. Before giving subsidies, however, Governments should have clear policies on which fishing operations are eligible for subsidies.

5. Measures and policies for promoting economically viable and sustainable fishing practices and role of fisher and fishing industry associations, the private sector, national governments and FAO

The working group recommended that FAO should advise governments on making plans for promoting sustainable fishing operations in the various sectors of the fishing industry. FAO should also assist in developing programmes for community-based fisheries and coastal area management programmes with active participation of fisheries organizations and other relevant industry groups. The approach of such assistance should be based on how

to effectively manage a degraded fishery. Sufficient emphasis should be given to improved information systems on markets.

Suitable credit policies may be used in support of sustainable fishing practices. Fisheries resources linked credit plans as developed by NABARD in India could form the basis for fisheries credit policies in developing countries. Necessary legal regimes may be developed or updated, as the case may be, to better incorporate the provisions of FAO's Code of Conduct for Responsible Fisheries. Assistance should also be given to develop effective MCS systems in developing countries for offshore and deep-sea fisheries. Co-management regimes may also be considered to better manage the coastal fisheries resources.

Working group II: Promoting sustainable fishing practices

Terms of reference

1. Which fishing technologies and practices covered by the case studies and the discussions of the workshop can be considered sustainable in the short and medium term and which not? Which factors affect their sustainability?
2. In which cases should fishing effort be diverted to other fishing practices and methods? Is it possible to modify existing fishing technologies (fishing craft and gear) for this purpose or does new fishing technology need to be introduced?
3. What support and promotional measures are needed to divert fishing effort with reference to 2?
4. Is there a need to adjust the capacity of fishing fleets in countries covered by the case studies and by the discussions of the workshop (both with reference to small-scale/inshore and large-scale offshore) and how can these adjustments be brought about?
5. What should the future emphasis of fishing technology and research be to support the promotion of sustainable fish capture practices?
6. With regard to 5, what role should fisher and fishing industry associations, the private sector, national governments, FAO and others play?

Summary of discussions and recommendations

The working group agreed that it is not possible to consider fishing practices in isolation; it is therefore more correct that consideration be given to sustainable fisheries, taking into consideration factors other than fishing technology.

Sustainability of fisheries depends on:

- Impact on natural resources or fish stock(s); for instance, fishing with mosquito nets or other types of fishing resulting in a high proportion of by-catch including many juveniles of commercial fish species, is not sustainable;

- impact on environment; for instance, using dynamite, fishing intensively in mangrove areas or dragging on coral reefs are not sustainable practices;
- fishing capacity: whether in access or appropriate;
- economic viability: taking into account, for instance, fuel and fish prices;
- social acceptability: from the point of view of employment or as the only permanent source of revenue for many people all year round or during a certain period of the year;
- technical viability: for instance, access to fishing gear and equipment, facilities for maintenance of equipment, extension and training facilities, fishing practices generating conflicts with other practices in use in the same area, are not sustainable.

Fishing technology

In general, it was felt that it is not possible to state that a type of fishing gear or method is not sustainable in itself. Many factors have to be taken into consideration, which are specific to each area.¹

However, it is generally recommended that fishing gear selectivity is improved and that, as far as possible, environmentally friendly fishing methods and practices be chosen.

Several participants of the working group observed that in several countries certain fishing gear or practices have proven to be too efficient affecting the catches of many small-scale fishers. It is worth bearing in mind that even traditional passive fishing methods can be unsustainable when used too intensively in a restricted area.

In general, considering progress/innovations in fishing technology, close attention has to be paid to the possible effects of the changes on the economic revenue, which can be expected. For example when fishing with light, will the catch double when doubling the power of the lamps? Similarly, before increasing horsepower/towing power of a trawler, consideration should be given to the optimal power needed per tonnage of vessel.

It was also observed that when an innovation has proven efficient on board one vessel it does not take long before it is adopted by many boats resulting in increased fishing capacity, possibly in excess and unsustainable. In addition, it was observed that there was a possibility that after one vessel has gained some additional profit, many other vessels quickly encounter difficulties in maintaining the sustainability of their operations.

After the presentation of this report, there were discussions as to whether bottom trawling practices should be considered unsustainable. In this context it was observed that recent technological improvements may have reduced some of the negative impacts of this fishing method on the environment, for instance, the intensive rubbing on the bottom. Conflicts between bottom trawling and other fishing methods such as gilthead, fishing with lines and pots could be avoided or greatly reduced if the zones where trawling is authorized are clearly marked.

Moreover, it was observed that it is not possible to stop or slow down innovations/"progress" in technology; the problem is to properly manage a fishery, which is unavoidably changing/reacting to external factors. In this respect, it was recognized that management of large-scale fisheries, in general, was easier than management of numerous small-scale activities.

Fisheries management and participatory approach

The necessity to reduce fishing effort globally was recognized, with attention, in particular, to coastal areas.

It was recommended to establish and implement conservation/management measures such as mesh size regulations and introduce zoning of fishing grounds (allocating certain fishing grounds to small-scale fisheries and to the utilization of small-scale, passive, fishing gear), including the establishment of protected areas where fishing can be partly or totally prohibited.

In this connection, it was observed that in many cases, after regulation and restrictive measures have been taken, the impact of these is not properly evaluated. For instance, several years after trawling has been banned in a certain area, it is still not clear whether demersal resources are now in a better condition. In this respect, it was suggested that a study be carried out in Indonesia.

It was also recognized by the working group that full direct consultation and involvement of all stakeholders, including fishermen, for the elaboration of management plans was a major (if not the main) condition for any chance of success of any plan (as clearly recommended in several articles of the Code of Conduct). In this respect, it was observed that a participatory approach would, in many cases, greatly facilitate and reduce the effort and cost of implementing any change in fishery communities and industries.

In connection with the consultation of fishermen and the participatory approach, it is essential to evaluate knowledge, attitudes and practices of concerned fishing populations before attempting to introduce any change or innovation.

In general, it was observed that keeping all stakeholders, including fishermen, fully informed is important as their awareness of existing global limitations and problems and responsible fisheries concepts may lead to replacing "blind" competition among fish harvesters/hunters by conscious cooperation, with mutual benefit.

Recommendations:

- While situations differ from country to country and fishery to fishery, there would be, in general, many advantages to be gained from sharing/exchanging experiences by having regular workshops to review different situations and developments.
- More data/information are still needed to fully understand the situations of the various fisheries referred to; for this purpose a data collection system should be elaborated and established among interested countries.

- Support from FAO should be sought to carry out comparative studies of fisheries in two or three countries fishing the same species and supplying the same international market (for instance, tuna line fisheries in several South Asian countries).
- Strong support for research on fishing gear selectivity, in general. In this respect, networking of experts, as initiated by FAO almost two years ago, is considered worthwhile.
- Considering that the practical improvement of fishing gear selectivity requires experiments and tests at sea in commercial fishing conditions, regional activities where a hosting country provides, at its own costs, a commercial fishing vessel for testing gear and FAO covers the expenses for the participation of observers from several countries and of an expert/consultant seems to be very appropriate.

Support to the development of certain technologies such as:

- Hook and line fishing for demersal fish;
- trawling technology with reduced or no impact on the bottom
- technology to keep the fish alive until it reaches the market, including the possibility of bringing fish to the market at the right time (to get the best price);
- technology for optimal utilization of all the catch and the best value addition to basic prices of the sea products (technology transfers are possible in this regard, especially from Asian countries);
- regarding resources allocation, these must be clearly shared out taking into account the interests of both large and small-scale fishing operators and fishermen;
- making a stronger effort to increase the awareness of fishermen regarding responsible fisheries and precautionary approach concepts, the need for selective fishing and proper management of all fishing activities;
- when planning to introduce any change or innovation within a fishery, and before taking any action, careful studies to evaluate knowledge, attitudes and practices of the concerned fishing population must be carried out.

Working Group III: Monitoring of Costs and Benefits of Capture Fisheries

Terms of Reference

1. Which are the essential indicators that should be monitored for the economic and financial performance of marine capture fisheries?
2. Should there be specific indicators for small-scale and large-scale marine fish capture operations and what are these indicators?
3. Should monitoring be expanded to other sectors of the fishery industry such as fish marketing and processing, aquaculture, etc.? If yes, which indicators should be monitored?
4. What methodologies and mechanisms should be used to ensure a regular monitoring of the costs and benefits of capture fisheries in future?
5. Who should coordinate the monitoring, in which form and how often should the findings be disseminated and published?
6. With regard to 5, what role should fisher and fishing industry associations, the private sector, national governments, FAO and others play?

Summary of discussions and recommendations

The working group recommended that - with a view to validating, updating and supplementing the information presented and discussed at the workshop - the economic performance of marine capture fisheries should in future be regularly monitored. While the coverage of countries and fisheries should be expanded, the institutions, organizations and individuals, involved in the recent studies on the techno-economic viability of fishing practices, should form the core of the future monitoring mechanism. Regarding the purpose of monitoring, choice of indicators, data sources, mechanisms and coverage, the following was suggested.

1. **Purpose and indicators for monitoring of small-scale and large-scale marine capture fisheries:**

Purpose of monitoring - provide information:

- bankers, investors and entrepreneurs on investment possibilities;
- fishers, entrepreneurs and their associations for comparison of economic performance;
- government for design and implementation of fisheries and environmental/coastal area management policies, regulations and measures;
- for scientific research.

Indicators

Level of exploitation of fisheries resources exploited by particular craft gear combinations in terms of development of total catch, CPUE, catch composition.

Economic and financial indicators

- (1) cost of investment C
- (2) Earnings = value of catch
- (3) Direct costs of operations including insurance, harbour fees, licence fees
- (4) Gross margin I = (2) - (3)
- (5) Administration costs/overheads, association fees
- (6) Gross margin II = (4) - (5),
- (7) Depreciation,
- (8) Interest/opportunity cost of capital
- (9) Net surplus before tax = (6) - (7) - (8)
- (10) Taxes
- (11) Net surplus minus tax = (9) - (10)
- (12) Sharing systems
- (13) Earning per crew member

Ratios to be monitored:

- (14) Rate of return on investment
- (15) Rate of profit to earnings
- (16) (Net surplus + taxes + wages): investment

Special case studies of impact of natural phenomena (typhoons, El Niño) on economic performance of fisheries sector

Special case studies on fish marketing and processing

2. Data sources, methodologies and mechanisms

Data sources: fishing companies/accountants, fisher associations, landing sites/harbours, fishermen settlements.

Methodologies: interviews of purposively selected, stratified sample of operators, buyers, suppliers, financiers, companies, accountants three times a year (every 4 months).

Participating institutions and organizations: same as in this study plus independent academic and research institutions and fisheries associations and fishery industry associations.

Funding: participating institutions and organizations with contributions from fishing enterprises, fisher associations and support from FAO under TCDC, TCP and FAO Regular Programme. Exploration of funding support from private sector and donors.

3. Coordination of monitoring and dissemination of results, role of participating research institutions, fisheries associations, government agencies, regional networks, FAO

Participating national/regional institutions to designate coordinator/liaison officer

FAO to contact already participating institutions and also new institutions to be involved in the Philippines, Japan, South Africa, Namibia, Morocco, South Pacific (Forum Fisheries Agency), Chile (IFOP), Brazil, Venezuela. In all countries, small-scale fishing fleets should be included in monitoring.

Research institute to process information.

FAO to disseminate/publish information also on Web page

National participating institutions to communicate information to national end users and to obtain feedback.

FAO to organize bi-annual review workshop to assess changes in economic performance of fisheries sector and to review feedback from users of information and use of monitoring results for purposes listed under 1. Evaluation of usefulness of indicators.

Between 1995 and 1997 FAO, in cooperation with fisheries research institutions and administrations in selected countries in Asia, Africa, Latin America and Europe carried out studies on the economic and financial viability of the most common fishing craft and gear combinations. The findings of the studies were presented and discussed at an interregional workshop held in Kuala Lumpur, Malaysia from 15 to 18 December 1997. They suggest that in spite of fully and sometimes overexploited fisheries resources,

in most cases marine capture fisheries are an economically and financially viable undertaking which generates sufficient revenue to cover the cost of depreciation as well as the opportunity cost of capital. Marine capture fisheries also generate funds for reinvestment, in addition to employment, income and foreign exchange earnings. With a view to safeguarding the economic performance of the fishing industry, the workshop considered it pertinent that countries put in place, in close cooperation with fishers and fishery industry associations, efficient measures to limit fishing effort and to preserve and rehabilitate coastal areas and aquatic resources. Countries should also make special efforts to protect small-scale fisheries sectors.

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